ISBN 0-315-61771-3

AN ECONOMIC AND TECHNICAL ANALYSIS OF POTENTIAL FOREST INDUSTRY DEVELOPMENTS IN LABRADOR

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AN ECONOMIC AND TECHNICAL ANALYSIS OF POTENTIAL FOREST INDUSTRY DEVELOPMENTS IN LABRADOR

by

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A project report submitted to the School of Graduate Studies in partial fulfillment of the requirements for the degree of Master of Engineering.

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Memorial University of Newfoundland
April, 1984

St. John's Newfoundland

ABSTRACT

An analysis is performed to determine the intrinsic economic value of four potential forest industry developments for the Goose Bay area of Labrador and their relative attractiveness to investment. These are a newsprint mill, an integrated newsprint mill and sawmill, a chemi-thermo-mechanical pulp (CTMP) mill and an integrated CTMP mill and sawmill.

Prior to carrying out the analysis, a review is made of past attempts to develop the forest resources of Labrador, the choice of these four particular forest industry options is explained, and key considerations to the development of these options are discussed.

The analysis employs discounted cash flow (DCF) criteria for evaluating these investments, eg. rate of return (ROR), net present value (NPV), and others. A computer model developed by the author is used to assist in the analysis. The industry options are first evaluated under base case conditions in which it is assumed that these projects would be financed only by investor equity. The sensitivity of base case results to potential changes in components of interest is then evaluated. This allows

determination of the relative importance of all factors, and consequently also determines what leverage is available to Government and prospective developers for improving the attractiveness of these investments.

Under base case conditions, none of these investments meets the minimum criteria for investment. Moreover, the results indicate that an integrated newsprint mill and sawmill or an integrated CTMP mill and sawmill are less attractive investments than a newsprint mill or CTMP mill alone. These options are therefore, eliminated from further analysis. Penalties and benefits associated with locating in Labrador are quantified in terms of ROR and it is concluded that there is a net penalty in each case. The potential for debt financing to overcome these net penalties and to make these projects meet the minimum criteria for investment is examined along with various forms of financial incentives available to Government, eg. tax relief, subsidies, grants, loan guarantees. It is concluded that these measures have the potential available for making a newsprint mill or CTMP mill development in the Goose Bay area of Labrador an attractive investment.

ACKNOWLEDGEMENTS

Much of the research for this paper was carried out in conjunction with my work with the Department of Development, Government of Newfoundland. I wish to thank the management of the Department for their kind permission to use this material and for their co-operation in the preparation of this paper.

I would also like to express my appreciation to my supervisor, Mr. Dag Friis, Assistant Professor, Faculty of Engineering and Applied Science, Memorial University of Newfoundland, for his advice and support.

The technical assistance of my co-workers, Mr. Philip Carter and Mr. Stephen Goudie, in carrying out this work is also acknowledged, as is the input by Mr. Robert Pelley and Mr. Barry Garland of the Department of Forest Resources and Lands.

In addition to the references specifically cited in this paper, the following companies and organizations contributed information for which I would like to extend my thanks:

Abitibi-Price Incorporated

Acres Consulting Services Limited

Bowater Newfoundland Limited

Canadian Paper Analyst

Canadian Pulp and Paper Association

Data Resources, Incorporated

Department of Regional Industrial Expansion
Government of Canada

H. A. Simons (International) Limited

Newfoundland and Labrador Hydro

Sandwell Management Consultants Limited

S.N.C. Cellulose Incorporated

Woods Gordon

Most especially, I wish to express my love and heartfelt gratitude to my wife, Judy, and my family for their support, empathy and sacrifice without which this paper would not have been possible.

D.B.M., April, 1984

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LIST OF ABBREVIATIONS

AAC	Annual Allowable Cut
ADT	Air Dry Tonne
ARCO	Atlantic Richfield Corporation
CCA	Capital Cost Allowance
CIF	Cost, Insurance, Freight
CTMP	Chemi-Thermo-Mechanical Pulp
DCF	Discounted Cash Flow
DRIE	Department of Regional Industrial Expansion
FMU	Forest Management Unit
FOB	Free On Board
GNP	Gross National Product
IRDP	Industrial Regional Development Program
km	Kilometers
kV	kilovolts
M^3	cubic meters
mW	megawatts
NPV	Net Present Value
ODT	Oven Dry Tonnes
ROR	Rate of Return
SBK	Semi-Bleached Kraft (Pulp)
TMP	Thermo-Mechanical Pulp

1. INTRODUCTION

The potential for development of forest industry in Labrador has long been the subject of speculation and enthusiasm. Development of a lucrative sawmilling industry and the establishment of pulp and paper mills on the island of Newfoundland prompted a rush to acquire timber licences in Labrador early in this century. This sudden interest was based on very little reliable resource data or knowledge of development parameters in the area. As a result, the resource was effectively tied up for years with very few development proposals being realized - none of which have lasted.

Gray[1] relates that the first significant forest industry in Labrador was the export of pit props, used in mining, from the Port Hope Simpson area on the coast between 1934 and 1942. This was followed by an export pulpwood operation in the same area between 1953 and 1972 carried on by the Bowater Corporation - the owner and operator of a major pulp and paper mill at Corner Brook on the island of Newfoundland. Only about 193,000 cubic meters of pulpwood was exported through this operation during this entire period. Other operators working out of Cartwright and St. Michael's Bay also exported some small volumes of pulpwood.

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1. Gray, J.A.; The Trees Behind the Shore - the Forests and Forest Industries in Newfoundland and Labrador; Economic Council of Canada; Canadian Government Publishing Centre; Hull, Quebec; 1981.

Historically, the export pulpwood business in the Province has been very unstable. This is because of the small quantities which have been available and the relatively long distance from markets. Pulpwood from the Province is not price competitive with that from suppliers nearer the markets and sold in large lots - often under long term contract. Only when the pulp and paper industry is at the crest of its normal business cycle (about every seven years) is the demand for pulpwood and the margin available sufficient to consider purchasing high cost incremental pulpwood supplies from Newfoundland or Labrador. In order for a pulpwood export operation to have some permanence, a captive market would have to be secured, eg. a pulp or paper mill which depended on this source of wood for its normal production - not just incremental production.

Sawmilling in Labrador, as on the island of Newfoundland, has traditionally been carried on in very small, predominantly "push-bench" type operations catering to local needs. Total annual production in recent years has only been about 1400 cubic meters of lumber spread between 50 to 60 mills.

The largest effort to exploit the Labrador forest resource to date was by Labrador Linerboard Limited, a subsidiary of Canadian Javelin Limited, in the late 1960's and

early 1970's. A kraft pulp mill to produce linerboard was constructed at Stephenville on the island of Newfoundland and was to be supplied with wood from a harvesting operation in the Goose Bay area of Labrador. Timber cutting began in 1969 but mill operations did not commence until 1973 due to a number of delays.

Even before start-up, it was evident that the project was in serious trouble. The main reasons for this were that,

1. the volume of timber which could be cut and shipped from Goose Bay annually had been grossly over-estimated.
2. the cost of wood delivered to Stephenville was unnecessarily and unacceptably high.

The operation had been planned around the assumption that between 1.1 and 1.2 million cubic meters of wood could be obtained from the Goose Bay area each year. It was even thought at one point that a further 0.7 million cubic meters of wood was available for export to other markets. In fact, however, it was subsequently learned that the annual sustainable harvest was only between 360,000 and 400,000 cubic meters. Furthermore, it had been originally planned to chip the wood at Goose Bay to facilitate shipping. The chipping

plant was, however, located at Stephenville which meant that wood had to be shipped in round form. The dock facilities at Terrington Basin near Goose Bay (Figure 3) could only handle about 410,000 cubic meters of round wood annually under optimum conditions.

The high cost of wood was attributable to the added shipping and handling as well as a number of other items, including:

1. Logging equipment was poorly suited to Labrador operating conditions resulting in breakdowns and poor productivity.

2. Unavailability of resident skilled woods workers necessitated generous incentives to attract a labour force to the area, incurred additional costs in housing and camps, and led to cronic absenteeism.

3. Parts and service for logging equipment was often unavailable locally.

4. A union agreement which did not allow management flexibility in adapting to Labrador conditions.

Labrador Linerboard Limited was also plagued by weak markets for its product and in 1976 the Provincial Government, which had taken control of the operation some years earlier to secure its financial investment and interests, was obliged to close down the operation to cut its losses.

Following the demise of Labrador Linerboard Limited, the Government of Newfoundland through the Department of Industrial Development contracted Project Management and Design (1974) Limited of St. John's to carry out a study of the feasibility of establishing a major sawmill and wood chip export operation in the Goose Bay area. The study concluded that the forest resource could support such an operation producing up to 48,000 cubic meters of lumber annually and 145,000 cubic meters of woods chips and could be marginally profitable provided,

1. consistently stable markets could be found for lumber and wood chips at prices not less than those available at the time of the study.

2. the sawmill would be located adjacent to the public wharf at Terrington Basin.

3. the favourable effect caused by the devalued Canadian dollar relative to currencies in market countries in Europe did not change.

4. a highly efficient sawmill design and mechanized wood harvesting system was adopted.

5. wood volumes South of the Churchill River could be confirmed by more intensive inventories and an economical means of accessing this timber could be put in place.

Prompted in part by this study, a group of local business people formed the Goose Bay Timber Company in 1978 to proceed with development of a similar operation. Their idea was to build a sawmill with a design production capacity of 24,000 cubic meters of lumber annually which, during the initial operating period would draw its wood requirements from some 140,000 cubic meters of wood cut by Labrador Linerboard Limited and left stacked at various locations around Goose Bay. This wood was made available by the Provincial Government for much less than its replacement value as an incentive to development. This would enable the Company to generate a cash flow from which to finance the establishment of a wood harvesting operation. Pulpwood from

the Labrador Linerboard Limited inventory and later harvested by the necessity of clear cutting would be sold in round form.

The Goose Bay Timber Company began operations in June, 1980 but was troubled from the outset by poor layout in the mill, unexpectedly high cull of the Labrador Linerboard Limited wood due to its deterioration, and inexperienced labour and management. Production severely lagged projections and eventually the Company could not meet its financial commitments and was forced to close in October of the same year after producing only 700 cubic meters of lumber. Other problems were evident which in time could have led to the same outcome:

1. The sawmill was not located adjacent to the dock facilities at Terrington Basin and consequently incurred unnecessary costs in handling product for shipment.

2. The advantages of converting both sawmill residues and pulpwood to woodchips were not exploited.

3. Markets for lumber and pulpwood were not well secured.

It is clear from the facts that the failures of Labrador Linerboard Limited and Goose Bay Timber Company are mainly attributable to bad planning. Without this knowledge, however, the impression developed in forest industry circles that constraints peculiar to Labrador made development of any forest industry there impractical.

In 1978-1979, at the time the Goose Bay Timber Company project was getting off the ground, the Government of Newfoundland through the Department of Forestry and Agriculture contracted Sandwell Management Consultants Limited of Vancouver, British Columbia, to carry out a study to identify other prospective forest industries for the Goose Bay area which could perhaps be integrated with such a sawmill development to utilize sawmill residues and pulpwood. This area had been determined to contain the largest commercial concentration of timber and had been designated Forest Management Unit 19 (FMU 19) by the Department of Forestry and Agriculture. The list of likely products was narrowed down in the initial stages on the basis of wood characteristics and volume available to the following:

1. status quo, i.e. export raw fibre,
   either: roundwood
   or: woodchips

2. panel products: medium density fibreboard
   hardboard
   particleboard
   waferboard

3. market mechanical pulp,
   either: pressurized stone groundwood pulp
   or: thermo mechanical pulp (TMP)

4. newsprint

In fact, a company - Labrador Forest Products Corporation Limited, operated by Ryer Van Beek - a prominent timber harvesting contractor on the island of Newfoundland - had been licenced to export pulpwood from the Goose Bay area and had operated concurrently with the Goose Bay Timber Company during its short life. Very little pulpwood was ever exported, however, for the reasons outlined previously.

The study concluded that only waferboard and, to a lesser degree, market mechanical pulp offer any prospect of achieving a reasonable return on either total investment or equity under the assumptions used. Waferboard, up to that time, however, was made without exception from semi-hardwood

such as aspen and poplar and the technical compatability and market acceptance of waferboard produced purely from softwoods, as would be necessitated in Labrador, was unknown. Subsequent testing did indicate that a product of equal or superior properties to standard waferboard could be manufactured from Labrador softwoods. Doubt remained, however, whether a waferboard plant in Labrador could effectively compete in established North American markets against plants more advantageously located to serve these markets. While such a plant would be in a strategically better position to serve Europe, this market was largely undeveloped at the time and much smaller than the output of such a plant.

A number of shortcomings in the Sandwell study were subsequently identified which challenged whether the prospects for forest industry development in Labrador were as negative as the report had concluded.

1. The rates of return for each product option had not been derived by a full discounted cash flow analysis but rather by a simpler method of questionable validity.

2. The Consultant had assumed substantial cost penalties associated with construction in Labrador, such as poor productivity of Newfoundland workers, which were not quantified or substantiated.

3. Operating cost factors were not subject to sensitivity analysis to identify critical costs and no examination was made of ways to minimize these costs. Thus, optimum site selection, the potential effect of extending the shipping season, etc. were not considered.

The Sandwell study drew attention to the dearth of reliable information about development parameters in Labrador from which to evaluate specific forest industry prospects and which was largely responsible for the negative attitudes regarding such prospects prevailing in industry circles. The effect of this was to stifle interest in this area which otherwise would be expected from established, reputable companies in this sector looking for expansion opportunities. Those development proposals which were forthcoming generally lacked substance and often the proponent had no proven track record from which to judge the probability of success. This situation was aggravated by a severe downturn in the pulp and paper industry beginning in late

1981 after three boom years in which many companies undertook massive modernization programs. These companies were subsequently hard pressed to meet these financial commitments and sustain existing capacity and were understandably not receptive to considering expansion opportunities in Labrador.

It became clear that in order to develop the forest resources of FMU 19, Government would have to shift its role away from being largely reactive and toward more actively promoting this opportunity. With this aim, the Department of Development and the Department of Forest Resources and Lands jointly formulated a promotion strategy in early 1982, the key elements of which were as follows:

1. A review would be carried out of major Canadian and foreign pulp and paper companies to determine their strengths and weaknesses and likely receptiveness to being approached on this matter. A priority list of companies would be drawn up as a result of this review.

2. A brochure would be prepared outlining basic information about the forest resource development

potential in Labrador which would be distributed to these companies as a means of introducing the idea.

3. This would be followed up by personal presentation of a more detailed information package focusing on:
   - timber characteristics, distribution, likely harvesting scenarios, Government requirements, and present industry practices.
   - likely products, development parameters, financial projections, and possible Government incentives.

A computer model was developed to facilitate the preparation of financial projections which would serve a number of purposes, including:

1. assisting in selecting specific opportunities to present to industry.

2. exploring the feasibility of proposals received by Government, identifying problems and directing research to deal with them.

3. providing a focal point in early discussions with prospective companies.

4. providing a means for quickly responding to a prospective company's questions and objections.

5. providing a means of assessing negotiating positions.

It is necessary at this point to make reference to other concurrent development activities in Labrador.

From the early 1970's, the Government of Newfoundland has placed increasingly more emphasis on trying to develop the resources of Labrador to strengthen the Province's weak economy and to offset the especially poor economic and employment conditions in Labrador itself. In the process, it has become increasingly aware of the complexity of the problems involved in attracting new industry to this area. The Labrador Resource Development and Transportation Plan, Phase I Report, released in 1981, documents the resource potential of Labrador and the constraints on its development. It also reviews past planning activities and studies and those ongoing at the time of the report. Based on this information, it concluded that certain development projects, activities, and Federal/Provincial agreements were essential to

opening up Labrador and should form the basis of Government's development strategy for the area. These included:

1. establishment of an aluminum smelter or other energy intensive industry to provide a base market for developing hydro electric potential.

2. development of the Gull Island hydro electric generating site on the Churchill River.

3. provision of support infrastructure for new industry in the form of harbour facilities, industrial land, water supply, etc. in the Goose Bay/North West Point area.

4. proving the technical and economic feasibility of year round navigation by ocean going vessels in and out of Lake Melville.

5. funding for a Trans Labrador highway from Western Labrador to the Strait of Belle Isle.

It was felt that other potential developments such as a new forest industry could be more easily induced to locate in the area with the successful completion of these items.

In fact, an aluminum smelter for Labrador had been discussed with several interested companies as early as the late 1960's and in 1979, the Department of Industrial Development began a new initiative in this regard. In 1981, Anaconda Aluminum, a subsidiary of the Atlantic Richfield Corporation (ARCO) agreed to participate jointly with Government in a feasibility study of such a project for several locations in the Province, one of which was North West Point at the western end of Lake Melville. Beginning in 1980, the Department also initiated a series of extensive investigations into the problems of winter shipping in Lake Melville including several probes by Canadian Coast Guard icebreakers and one by the icebreaking cargo ship M.V. Arctic.

By early 1983, a great deal of information had been gathered through these activities and some potentially negative implications for developing a forest industry in the Goose Bay area had been identified. It was concluded that before embarking on a major promotional campaign, it would be prudent to first assess the effect of these implications and assure that one or more product options has a reasonable chance of success. A more detailed and rigorous financial analysis than that originally anticipated would, therefore, be required with the following objectives:

1. To establish the parameters for development of the most suitable forest industry options for Labrador.

2. To determine the intrinsic economic value of these development options and their relative attractiveness to investment.

3. To identify critical variables and the leverage Government can exert through various incentives to attract industry.

This analysis is the subject of this report. The information used in its preparation was drawn from sources already mentioned and others which will be introduced.

2. METHODOLOGY - DISCOUNTED CASH FLOW (DCF) ANALYSIS

2.1 Cash Flow

Financial analysis measures anticipated cash benefits accruing from an investment against the costs involved if the investment is undertaken. Cash benefits could be sales revenues, return of working capital or salvage value while costs could be capital expenditures, operating costs or taxes on income.

Cash flow is the difference between cash benefits and costs for a specified time period. If cash benefits exceed costs within a period, the net benefit is considered to be a positive cash flow; if, however, costs exceed cash benefits, the result is a negative cash flow. Thus, an investment is described by the distribution of associated cash flows over time. Yearly periods are usually best suited to most investments for evaluation purposes.

While cash benefits and costs actually occur throughout each year, it is often more convenient to consider them all occuring at a single point in time. An end of the year convention is adopted most often. Future costs and prices in that case should reflect their value at the end of each year but care should be taken to ensure that the level of cash

flow is representative of the entire year. The starting point of the analysis is always the present point in time.

2.2 The Treatment of Inflation and Escalation

Future cash flows can be specified in either constant money units or current money units. Constant money units have constant purchasing power measured by what they can buy at a particular point in time, eg. 1983, whereas current money units reflect changes in the purchasing power of money of nominal value from one year to the next. The difference between the two is the effect of inflation, i.e. the rate by which the purchasing power of money decreases with time, as distinguished from escalation which is the rate of increase in the real value of goods and services. Thus, cash flows in constant money units reflect only escalation whereas those in current money units also reflect inflation.

The arguments in favour of using constant money units are as follows:

1. It facilitates estimation of cost and price components. Current money estimates are implicitly based on the assumption that future rates of inflation are reasonably predictable, which may not be true.

2. Constant money cash flows are directly comparable in measuring profitability because they have exactly the same purchasing power. Evaluations of profitability, carried out in current money terms, however, embody a mixture of money values and are confusing.

Nevertheless, inflation significantly influences the effect of taxation on a project and therefore, cannot be ignored. This influence results because the level of taxes is based on the current money value of profits and because tax allowances (eg. capital cost allowance (CCA), investment tax credits, etc.) are based on actual historical costs as they were incurred. When these actual costs have to be carried forward to future years for tax allowances and when profit is in fact inflating, a lower proportion of the profit is relieved of tax each year. In other words, the real constant money tax allowance is less than the actual cost incurred. Similar distortions arise when debt financing is involved because loan interest and principal repayments are made in current money terms. While the nominal value of payments remains constant, the real value decreases with time and constitutes a decreasing proportion of cash flows. This means that the true constant money rate of return would be less than that actually realized under inflationary conditions.

The proper procedure then would be to estimate future costs and prices in current money units, calculate after tax cash flows and convert these to constant money units by removing the effect of inflation.

This model only deals in current money units, however, as this seems to be the prevailing basis for comparison of investment alternatives in the forest products sector.

2.3 Payback Period

A simple and consequently popular measure of the attractiveness of an investment is the payback period. It is defined as the length of time required to recover the initial cost of an investment from positive cash flows after operations begin.

"Payback period measures the return of investment whereas most methods measure the return on investment."[1] It is, therefore, often used in assessing the risk of investment loss in projects where there is a high degree of

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1. McKenzie, Brian W.; Mineral Investment Decision Techniques; McGill University - Professional Development Seminars; 1979, pp. 104.

uncertainty about the future. The greater the degree of uncertainty involved, the shorter will be the required payback period.

Payback period has several serious weaknesses, however, which exclude it from being used as the sole method of choosing between investment alternatives.

1. Cash flows beyond the payback period are not considered.
2. It does not recognize the time value of money.
3. Risk indicated by the payback period is not weighed against the potential for return on investment.

2.4 Cost of Capital

Financial analysis seeks to determine whether the anticipated return on investment as reflected by the time distribution of cash flows is greater than the cost of providing capital. The cost of capital is the highest return which could be obtained by investing in another opportunity, expressed as a compound interest rate. This may be increased by a risk factor which subjectively reflects the degree of uncertainty associated with the cash flows under consideration. The risk factor may vary from cash flow to cash

flow within one and the same project reflecting varying degrees of uncertainty.

2.5 Time Value of Money

A fundamental concept of financial analysis is that of the time value of money, i.e. a quantity of money today is preferable to the same quantity of money at some future point in time by virtue of its potential to earn more money in the interim through investment. Thus, the present value of individual cash flows is less the further into the future they occur. In order to compare these cash flow values, each is brought back to the present point in time or some other convenient reference point. The conversion of future cash flows to their present value is known as discounting and is accomplished by the following compound interest formula:

$$PV = \frac{CF}{(1+i)^N}$$

where,

CF = Cash flow value for the nth period in the future expressed in money units.

i = Cost of capital (also known as the discount rate) expressed as an annual compound interest rate (decimal fraction).

PV = Present value of the future cash flow at point of time 0.

N = The period of time between PV and CF in years.

Note that the discount rate is assumed to be a nominal rate based on annual compounding. Shorter compounding periods will yield the same results as an effectively higher annual compound rate which can be determined by the following formula:

$$\text{effective annual interest rate} = \left[1 + \frac{i}{p}\right]^{p} - 1$$

where,

i = Nominal annual interest rate (decimal fraction).

p = Number of compounding periods per year.

The above formulas are based on discrete compounding, eg. yearly periods. Under continuous compounding conditions, interest is compounded an infinite number of times each year and the above formulas must be modified as follows:

$$PV = \frac{CF}{e^{iN}}$$

and

Effective annual interest rate = $e^{i} - 1$

This analysis is based on discrete compounding.

The resulting discounted cash flows are the basis for measuring and comparing profitability.

2.6 Net Present Value (NPV)

It is assumed that a decision to invest in any of the projects under consideration would have no effect on a decision to invest in other opportunities. By inference, the amount of money available for investment must be unlimited. Under these circumstances, net present value can be used to compare investment in alternative projects.

"Net present value converts the anticipated time distribution of cash flows for an investment opportunity to an equivalent value at a particular point in time, the present."[1] The individual cash flows associated with an in-

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1. Ibid. pp. 120.

vestment are discounted to their present value using the cost of capital appropriate to the company involved and to the type of investment and are then summed, i.e.

$$NPV = \sum_{n=1}^{N} \frac{(CF)_n}{(1+i)^n}$$

The resulting difference between discounted positive cash flows and the discounted investment is the net present value. It represents the anticipated return on investment over and above the minimum return required on the capital provided. Thus, investments with the highest net present value are preferred; those with net present values less than zero, however, should be rejected.

2.7 Present Value Ratio

When alternative investments have different requirements for funds and there are limitations on the amount of funds available, a higher net present value resulting from a larger investment does not necessarily indicate a more attractive investment. In such cases, it is the net present value per unit of investment - referred to as the present value ratio - which is important. Present value ratio is obtained by dividing the net present value by the absolute value of the discounted investment. The investment or group

of investments with the highest present value ratio is the most desirable.

2.8 Rate of Return (ROR)

By fixing the net present value at zero and making the discount rate the variable, one can determine the average percentage yield from an investment over its life. This percentage yield is the rate of return (on equity) and represents the highest cost of capital which can be tolerated in providing funds without incurring a loss on the investment. Thus, the rate of return is the discount rate which makes the present value of operating cash flows equivalent to the present value of the investment, i.e. it is the value of "i" which satisfies the following equation:

$$\sum_{n=1}^{N} \frac{(CF)_n}{(1+i)^n} = 0$$

Rate of return normally can only be found by trial and error. The higher the rate of return, the better; the minimum acceptable rate of return, however, must be greater than the cost of capital referred to in this context as the hurdle rate.

2.9 Validity of Results

Implicit to the use of these profitability indicators is the assumption that positive cash flows can be reinvested where they will get similar returns, i.e. equivalent to the cost of capital used to determine net present value and present value ratio or equivalent to the rate of return.

These methods are valid for normal investments where negative investment cash flows in the initial stage are followed by positive cash flows in the operating stage. This type of situation yields a single rate of return. Because discounted cash flow profitability indicators are based on an n^{th} degree polynominal of the form.

$$NPV = 0 = (CF)_o + \frac{(CF)_1}{(1+i)} + \frac{(CF)_2}{(1+i)^2} + \ldots + \frac{(CF)_n}{(1+i)^n}$$

multiple rates of return are possible under certain circumstances. Some investments such as equipment replacement may have no positive cash flows attributable to them at all. In these instances, other evaluation techniques should be considered.

2.10 Sensitivity Analysis

The initial analysis is carried out using single point estimates of variables for each project. These estimates should be based on the best information available or in the case of controllable variables, on some reasonable initial assumption. A degree of variance and uncertainty can generally be associated with each of these, however, and it is useful to examine its potential effect on profitability indicators. Such an exercise is called sensitivity analysis.

The main uses of sensitivity analysis are,

i. to determine the critical variables in the analysis which should be the focus of further research or risk analysis.
ii. to examine alternative policies for controllable variables.
iii. to examine the effects of changes in timing.

The procedure generally involves making regular stepwise percentage changes in the point estimates of the variables of concern and graphing their effect on one or more profitability indicators. The combined effect of simultaneous changes in more than one variable can be determined by adding the effect of changes in individual variables.

Sensitivity analysis does not, however, evaluate risk as it does not assign a probability to the expected occurance of these changes in variables.

2.11 Risk Analysis

When the future value of key variables is uncertain, the evaluation of investment alternatives based on single point estimates should be supplemented by an analysis of the associated risk.

The most commonly used methods of accounting for risk are through risk adjusted payback period or risk adjusted discount rates - both of which were previously discussed - or through risk adjusted input parameters. These are not very satisfactory, however, especially for large or unique investments, ie., those for which there is no comparable experience and/or involve unusual cash flows, because of the arbitrary judgment which must be used to translate the perceived degree of risk into an appropriate adjustment.

More scientific methods are available which evaluate a project's risk based on the probability distribution of its variables. The role of these risk analysis techniques is to translate perceived uncertainties concerning future values of variables into probability distributions about their point estimates, and to determine the resulting probability

distribution for the indicators of investment attractiveness, eg. present value and rate of return.

To do this, the possible range of values for critical input variables is estimated and a probability of occurrence is assigned to each value in the range. When historical or empirical information is available on a variable, objective probabilities can be determined. If this is not possible, techniques are used to transform the limited information available and the opinions of the estimators based on their general experience into subjective probabilities. This can be equally valid because an estimate of the variation possible in a variable no matter how judgmental it may be, includes more information about what is known and what is not known than a simple single point estimate. The very fact that information is lacking is an important consideration. Thus, the aim is not to give the exact or true distribution of the profitability indicators but rather the one which best represents the level of reliability of the information available.

For investments in which there are only a few risk variables it may be possible to use exact mathematical methods to determine a probability distribution for profitability indicators. A very complicated risk analysis, however, would normally involve simulation procedures such as

the "Monte Carlo" technique to assign probabilities to outcomes.

Risk can be exactly determined only when there is a single risk variable or when risk variables have discrete probability distributions and are independent of one another. In these instances, profitability indicators can be determined for each possible combination of values for the input parameters and their joint probability assigned to the outcomes.

Because of time limitations, the consideration of risk associated with the projects in question has been left for analysis at some later stage.

3. THE FOREST RESOURCE

3.1 Physiography of Forest Management Unit 19

Forest Management Unit (FMU) 19 encompasses an area of approximately 866,000 hectares within a 130 km radius of Goose Bay at the western end of lake Melville (Figure 1). The area has been further divided into four subunits as indicated in Figure 2. The largest timber and most concentrated stands occur in subunits 1,2 and 3, however, subunits 1 and 2 were extensively logged by the Labrador Linerboard Limited operation.

The Churchill River virtually bisects the Unit in an East-West direction but about two thirds of the forest resource is located on the South side of the River. As there is presently no bridge spanning the River, one would have to be built to accommodate any future logging operation. The most likely site would be at Muskrat Falls, approximately 30 km upstream from Goose Bay, where the River narrows substantially. This is also the point tentatively chosen for the proposed Trans-Labrador Highway to cross the Churchill River. It would be logical to build the bridge to meet the requirements of this highway and, therefore, it is a likely item for government participation.

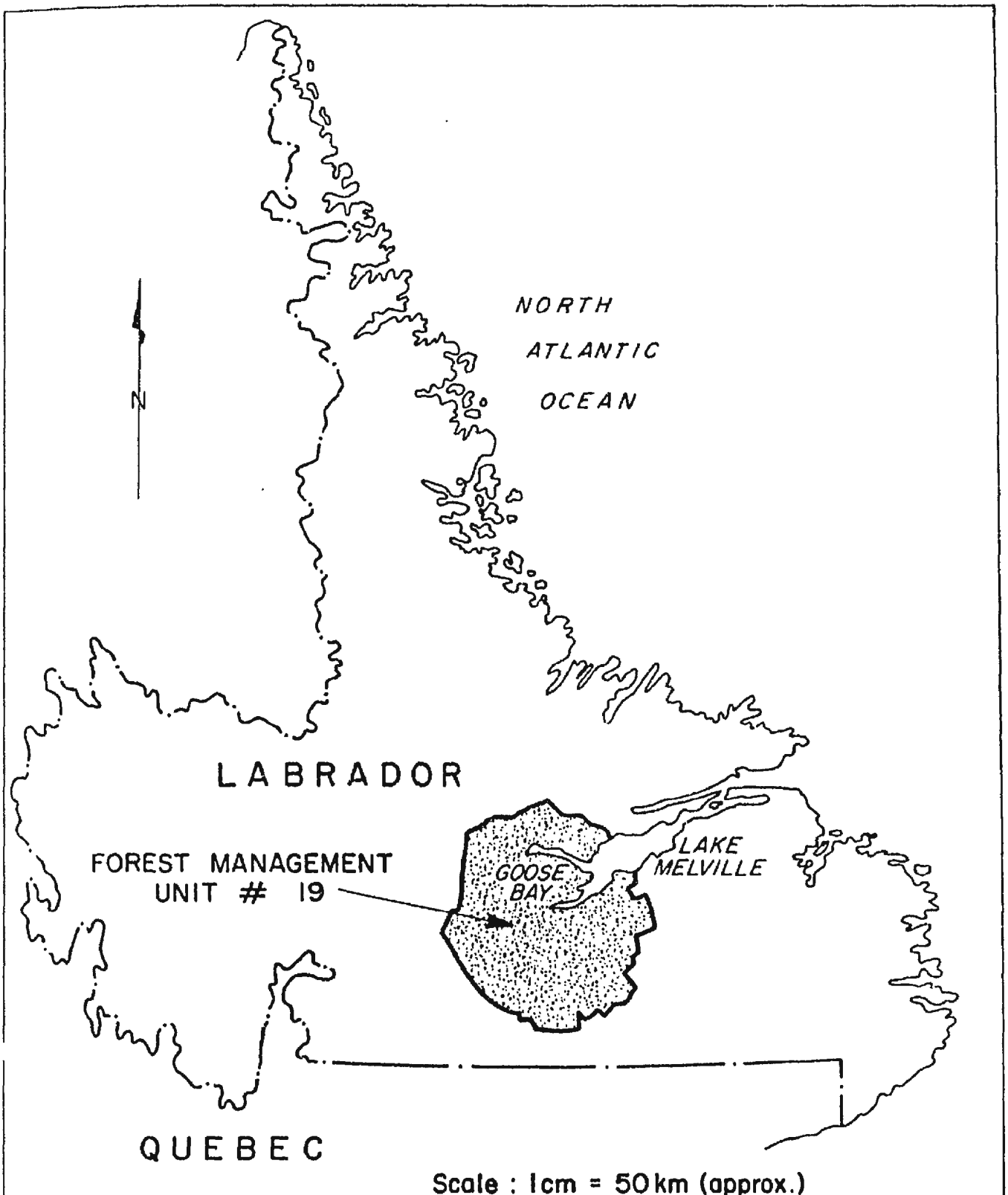
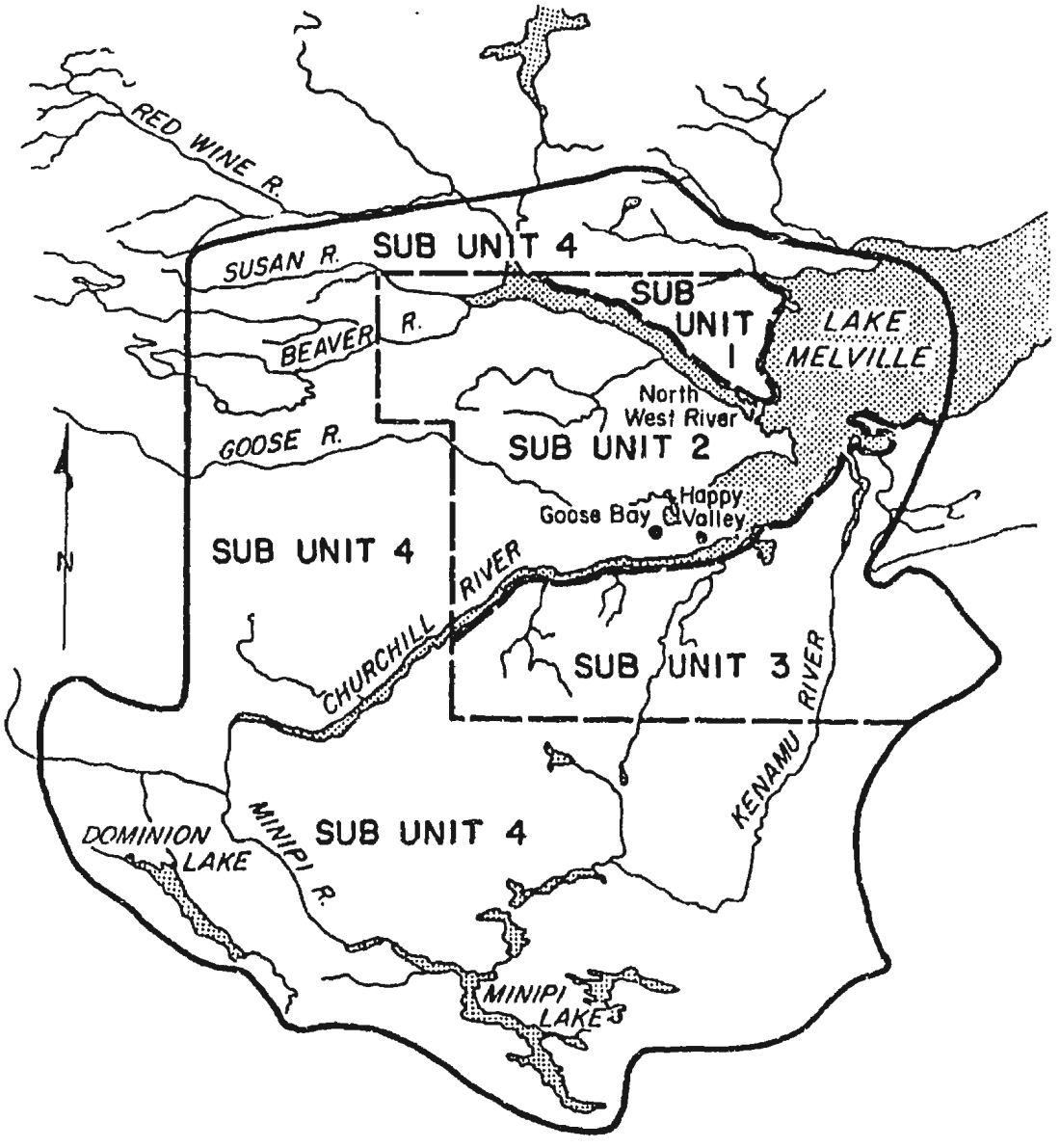


FIGURE 1 - LOCATION OF FOREST MANAGEMENT UNIT 19



Scale : 1 cm = 13.4 km (approx.)

FIGURE 2 - FOREST MANAGEMENT UNIT 19

The topography of FMU 19 is mostly gently rolling land ranging in elevation from sea level up to 580 m. The area is drained by many rivers most of which flow into the Churchill River. The area is generally amenable to standard logging techniques, i.e. using skidders where the slope does not exceed 30% and using cable logging technology developed on the island of Newfoundland for steeper slopes. Nevertheless, some areas are too steep or present special problems for economical logging and cannot be included in estimates of available timber.

The area experiences a short growing season and relatively long and cold winters with heavy snowfalls. Climatic conditions are not considered to be any worse than those encountered by logging operations in areas of Quebec, Northern Ontario and Scandanavia. The period during which logging is normally curtailed because of poor ground conditions during spring thaw may, however, be slightly longer than on the island of Newfoundland.

3.2 Timber Composition and Characteristics

Softwoods account for approximately 96% of the timber in FMU 19 and, therefore, constitute the commercial species. 66% is black spruce and 26% is balsam fir with larch, white spruce and other softwoods making up the other 4%. Hardwood species are predominately white birch and aspen.

The Department of Forest Resources and Lands nas indicated in discussions that approximately 30% of the softwood volume is suitable for lumber production using standard sawmill technology. The remaining 70% is classed as pulpwood. (For the purpose of this analysis, sawlog material is defined as any portion of a tree that can yield a log 2.50 meters in length or more with a net top diameter inside bark of 12 cm or more after deductions for cull and decay. Pulpwood is defined as trees of 8 cm or more net top diameter inside bark which are not suitable as sawlogs.) Because the distribution of sawlogs and pulpwood is fairly homogenous, however, it is not possible to "highgrade", i.e. harvest sawlogs without harvesting pulpwood. Consequently, a sawmill is not feasible unless a use can be found for the pulpwood which must be cut to get at the sawlogs.

The black spruce which predominates in Labrador and in other northern areas of Canada is highly prized in pulp and paper manufacturing for its characteristic whiteness and very high fibre density. Sandwell Management Consultants[1] obtained the following wood density information from the Newfoundland Forest Research Centre of the Canadian Forestry Service:

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1. Sandwell Management Consultants Limited; Labrador Forest Industry Development, Phase 1 - Project Identification Study, report X-4517; prepared for Department of Forestry and Agriculture, Government of Newfoundland and Labrador; Vancouver; May, 1979; pp. 22-23.

Table 1 - OVEN DRY WEIGHT PER UNIT VOLUME OF GREEN WOOD

(tonnes/m^3)

Black Spruce	0.437
Balsam Fir	0.360
Weighted Average (70/30 spruce/fir distribution)	0.415

Pulping tests carried out on these species indicate that the following brightness levels are achievable without bleaching:

Table 2 - SPRUCE/FIR PULP BRIGHTNESS LEVELS

TMP:	56%
CTMP:	61%

3.3 Wood Volumes and Sustainable Yield

A recent report[1] commissioned by the Department of Forest Resources and Lands has concluded that the net economically harvestable volume of softwoods in FMU 19 is about

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1. Highlands Contracting Ltd.; Conceptual Harvesting Plan for Forest Management Unit 19, draft; prepared for Department of Forest Resources and Lands, Government of Newfoundland and Labrador, St. John's; March, 1983; pp. 11-13.

32.4 million cubic meters. Timber stands judged too costly to access or insufficiently dense to make commercial harvesting worthwhile have been excluded from this figure. Some timber growing on slopes too steep for conventional steep slope harvesting technology, i.e. greater than 60°, have also been excluded. Deductions have been made for bark, cull, decay, logging waste and reserve areas.

There is insufficient historical or scientific data to conslusively determine the rotation period, i.e. the time required to grow new timber to maturity after harvesting, in Labrador. The concensus among investigators is that it is between 90 and 120 years. The report concluded that the lower limit of 90 years is realistically achievable if a mixture of natural and artificial regeneration is employed. The annual sustainable harvest or annual allowable cut (AAC) in this case was calculated to be 360,000 cubic meters using the following formula:

$$AAC = \frac{Vm}{R}$$

where, Vm is the net merchantable volume, 32.4 million m^3.

R is the rotation period, 90 years.

No provision was made for incremental volumes becoming available as they mature because the forest is 90% mature to overmature at present. The AAC also assumes no liquidation

cut, ie., increasing the AAC early in the rotation but decreasing it later. This would increase the size of a forest industry which could be established now and could be economically attractive from an investment viewpoint. It would, however, mean that the industry would have to cut back or even close down at some later point which is unacceptable to Government because of the social disruption it would involve.

3.4 Harvesting

Some timber - mostly in subunit 2 - is accessible by roads remaining from the Labrador Linerboard Limited operation and may form the initial harvesting base while a new operation is getting started. To access the full economically harvestable volume of FMU 19, however, it is estimated that a further 200 km of capital roads is required in addition to the major bridge at Muskrat Falls. Moreover, it is important that this road network be built early in the life of a new operation to balance the lower yield and greater trucking distances involved in logging subunit 4 compared to the other areas. The average trucking distance to the mill would then be about 40 km. Because of the distances from Goose Bay it is likely that one or two logging camps would be required.

4. PRODUCT OPTIONS

The Sandwell study of 1979 arrived at virtually the same assessment of the forest resource capabilities and characteristics of FMU 19 as the report just mentioned. The product options considered in this analysis were, therefore, selected largely on the basis of Sandwell's preliminary identification of possible products and some subsequent assessment.

From the forest resource data alone, a number of products were ruled out. Plywood production was judged not to be technically feasible as there are too few logs of sufficient diameter for peeling. For the same reason, veneered panel products were not considered. As witnessed by the experience of Labrador Linerboard Limited, kraft pulp or paper/paperboard based on kraft pulp is out of the question because the AAC is much less than the wood requirements of the minimum size kraft pulp mill considered viable in North America. Similarly, the production of mechanical paper grades requiring the importation and addition of 30% or more chemical pulp for fortification, eg. lightweight directory or catalogue papers, lightweight coated magazine papers, was not considered practical. Paper products requiring attributes not readily attainable from the species mix in Labrador were also disregarded eg. writing paper in which opacity

and smoothness are important. The volume of timber of dimensions suitable for utility poles is insufficient to support a commercial operation.

The Sandwell study excluded some other options on different grounds. While the benefits of burning hog fuel (bark, fines, sawdust, etc.) generated by an operation to offset certain energy requirements was recognized, the prospects for burning forest biomass or the pulpwood component of the resource to generate electricity, steam for heating or even liquid fuels were thought to be poor in the Goose Bay situation. The possibility of producing cattle fodder from wood was also rejected because of the unsuitability of the wood species and the lack of a local market.

The short list of product options settled on by Sandwell for its study has been outlined in the introduction to this report. While discounting the indicators of investment attractiveness arrived at by the Consultant for the reasons previously given, the thinking towards these options was as follows.

Even if the historical problems associated with the export of raw wood fibre, either as round wood or wood chips, could be solved, this is the least desirable option from Government's viewpoint because of the very low level of

added value involved. A possibility not considered by Sandwell, however, is supplying this wood to one of the existing newsprint mills on the island portion of the Province in support of expanded production capacity. The most suitable mills would be the Abitibi-Price mill at Stephenville or possibly the Bowater Mill at Corner Brook. Discussions with these companies, however, indicated that neither company was interested in such an investment in the foreseeable future.

Like waferboard, other panelboard products produced at Goose Bay would be located too far from major markets to compete effectively with plants located closer to these markets. They would also be at a cost disadvantage with many plants which make their product from sawmill residues rather than round wood.

It was felt that the product options most likely to attract investment are these for which the qualities of the wood species and the availability of abundant hydro electric power at stable rates in Labrador offer a distinct advantage. These are market TMP and newsprint. Pressurized stone groundwood was dropped as a product option because it is more suited to situations where power is at a premium and some trade off of pulp quality for reduced power usage is acceptable. In fact, it was decided that chemi-thermomechanical pulp (CTMP), a further development of TMP, offers

the best opportunities for market mechanical pulp at present. CTMP is primarily used to supplement lower quality mechanical pulps in order to improve certain characteristics for particular papers. It is displacing some lower grades of chemical pulp used for the same purpose because it is less expensive to produce.

Both a CTMP mill and a newsprint mill are well suited to integrated operations with a sawmill because they can utilize sawmill residues in the form of wood chips. While some 52,000 cubic meters of lumber could be produced annually based on the sawlog quantities available, this would limit CTMP or newsprint production to about 121,000 tonnes annually. While this is an acceptable size for a CTMP mill, a modern, single machine newsprint mill has an efficient capacity of about 160,000 tonnes per year. If the sawlog portion of the timber resource was not used in lumber manufacturing but rather was made available for CTMP or newsprint, annual production would be about 150,000 tonnes. For these reasons, it was concluded that this analysis should examine CTMP and newsprint options both with an integrated sawmill and without.

As already alluded, the newsprint mill would be a single machine operation. It is envisaged that the CTMP mill would consist of two double stage refiner lines with

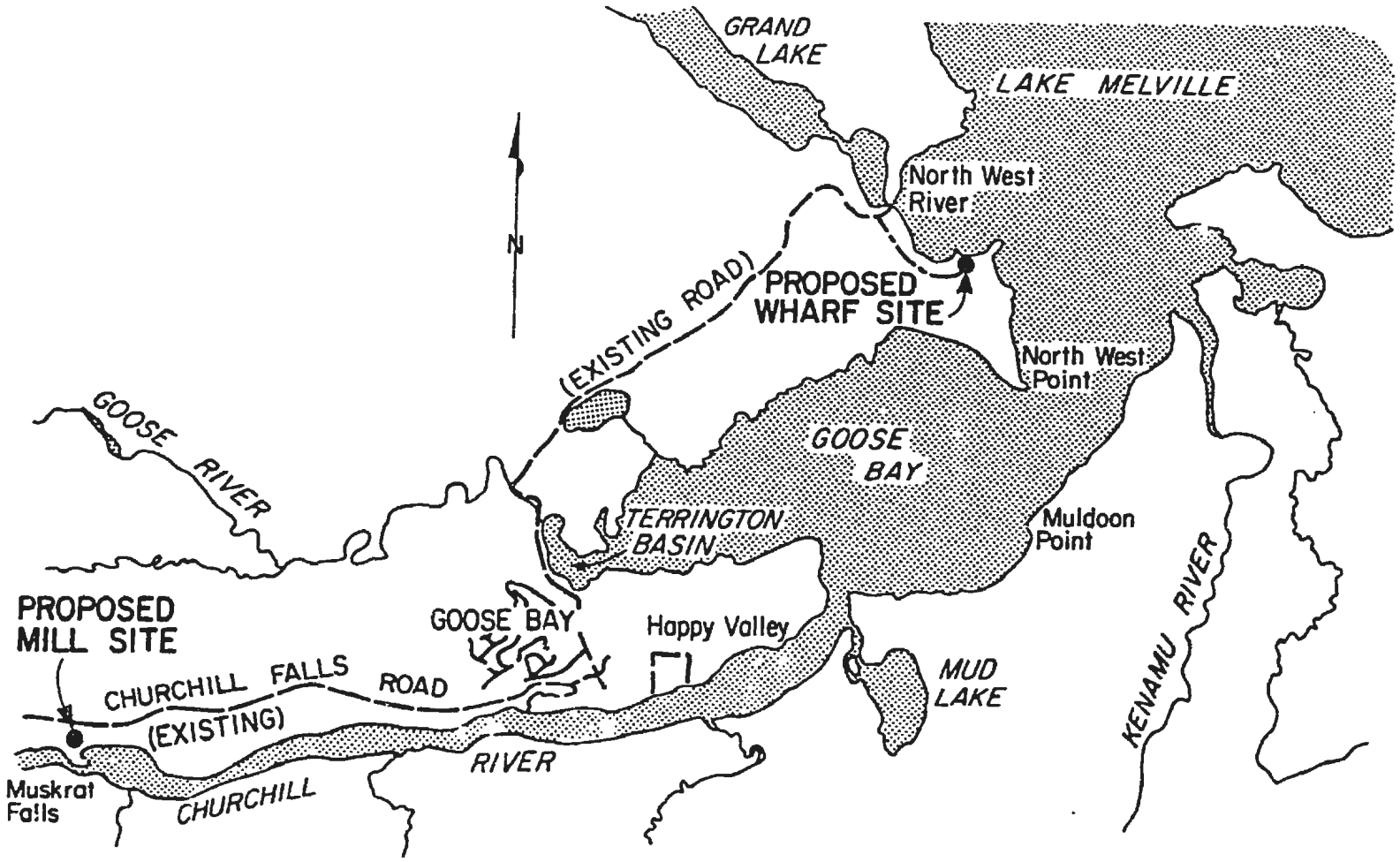
conventional flash drying and that some bleaching would be necessary to produce a variety of grades to match market requirements. In both cases, it is assumed that the different production levels with and without an integrated sawmill can be accommodated by different sized equipment rather than by a different number of production lines. The sawmill would include a kiln for the drying of lumber.

5. OTHER DEVELOPMENT CONSIDERATIONS

5.1 Personnel and Services

The town of Happy Valley - Goose Bay is the main community in the study area. It is located on the North side of the Churchill River near to where it flows into Lake Melville (Figure 3). North West River, about 30 km from Happy Valley - Goose Bay on the North shore of Lake Melville is the only other community of significant size in the area.

Happy Valley - Goose Bay developed as a result of the establishement of a major air base there during World War II by the Canadian Armed Forces for refueling allied aircraft being ferried from North America to Europe. It was expanded by the United States Air Force beginning in 1952 as a refueling centre for its Strategic Air Command operations which turned Happy Valley - Goose Bay into a booming service community. Logging operations by Labrador Linerboard Limited in the late 1960's and early 1970's added to its prosperity. By 1976, the Americans had phased out their operation and Labrador Linerboard Limited had closed. From a peak of 15,000 persons, the population has declined to about 8,000 with the loss of many valuable skills and support services. Unemployment in the area is high.



Scale : 1 cm = 3 km (approx.)

FIGURE 3 - GOOSE BAY - HAPPY VALLEY AREA

From a personnel perspective, therefore, the Goose Bay area is both bad and good. Bad, because it is likely that many jobs requiring specialized skills, both in construction and operations, will have to be filled from outside the area with all the attendant disadvantages. A new industry would also have to have its own maintenance crew as there would be little possibility of contracting this work out - at least initially. On the good side, there is a large pool of unemployed workers from which some could possibly be trained to fill job opportunities. Also it may be easier to attract skilled workers to Goose Bay than to other northern communities because of the availability of housing, recreation facilities, schools, hospitals, etc. inherited from the Canadian and American military presence.

5.2 Transportation

The Goose Bay area is not accessible by road or rail although the proposed Trans-Labrador Highway is supposed to connect the area to Western Labrador and the coast at some time in the future. Its main transportation links with the outside world for the present consist of commercial air service to the island of Newfoundland and to Montreal and coastal boats providing passenger and freight service to points in Newfoundland and along the coast of Labrador.

Any heavy industry establishing in the Goose Bay area must, therefore, bring in any materials it requires from outside and export its product by ship. The accepted shipping season in and out of Goose Bay through Lake Melville is six to seven months each year between June and December. During the remainder of the year, ice conditions in the Lake are generally too severe to risk unassisted passage by the vessels normally plying these waters. As there has never been an industrial requirement for year round shipping in the area, no icebreaker service is regularly provided. Bulk goods and large items required during this period must be brought in in advance and stockpiled. This is unacceptable to most heavy industries for reasons of cash flow, maintaining continuity of supply in markets and, in certain cases, possible product deterioration. It has also meant higher costs for building materials and delays in construction time, adding to capital costs. It has, therefore, been perceived as a major disincentive to industrial development in Goose Bay.

Investigations by the Department of Development in recent years aimed at extending the navigation season in Lake Melville, have concluded that year round shipping is feasible with icebreaking cargo vessels or ice- strengthened cargo vessels with icebreaker assistance. It is not possible, however, to penetrate closer to Happy Valley -

Goose Bay, than North West Point near the community of North West River. This means that the present dock facilities which are located at Terrington Basin in Goose Bay (Figure 3) are unuseable during winter months and that new dock facilities would be required in the vicinity of North West Point for year round shipping. There is a modern, two lane, paved highway connecting Happy Valley - Goose Bay with North West River.

5.3 Electric Power

The power requirements of the Happy Valley - Goose Bay area are presently supplied from the Churchill Falls hydro electric generating plant, some 350 km upstream on the Churchill River, under existing provisions for the recall of 300 mW. About 175 mW of this recall power is still available and is being promoted as an attraction for new industry to establish in the area. A very energy intensive industry such as an aluminum smelter would require much more power than this, however, and would be conditional on either more recall power being made available from Churchill Falls or new hydro electric generating capacity being developed at Gull Island or Muskrat Falls both of which are also on the Churchill River.

A 138 kV transmission line with a capacity of about 40 mW connects the Happy Valley - Goose Bay area to Churchill Falls. Any new industrial load in excess of about 15 mW would necessitate construction of a new transmission line to accommodate it.

Newfoundland and Labrador Hydro, which is responsible for providing power in the Province, is required by law to set power rates which cover the cost of providing service to its customers. The cost of service to a new industrial customer in the Happy Valley - Goose Bay area would consist of the cost of generation at Churchill Falls and the cost of providing transmission facilities to the area shared by all customers using these facilities according to their load. Power costs would therefore, depend largely on where a new industry locates, the extent of new transmission facilities required and the degree to which these can be shared by other consumers. As the cost components are essentially fixed, power rates to a new industry can be expected to be flat, at least in the initial operating years, and are not likely to ever increase greater than the rate of inflation. This is a major selling point to new industry.

5.4 Plant Site

Three possible plant sites were considered for this analysis (Figure 3):

1. North West Point
2. North side of the Churchill River near Muskrat Falls
3. Happy Valley - Goose Bay

The attraction of North West Point is that it is the closest point in the study area from which year round shipping can be conducted and a plant located adjacent to any new wharf there would minimize product storage requirements and handling costs. Recognition of this fact led to the commissioning of a study of this area - designated Port Labrador - as a potential industrial complex with an aluminum smelter at its core. The area has two major drawbacks, however, as the site for either a CTMP mill or newsprint mill:

1. The closest freshwater source of adequate size is Grand Lake, about 14 to 17 km distant. The cost of constructing a water supply line is estimated to be in the tens of million of dollars which would be an intolerable burden to place solely on such a mill.

2. Soil conditions in the area necessitate the employment of special load distributing construction for heavy loads at a cost premium.

Muskrat Falls, on the other hand, is adjacent to a huge freshwater source, i.e. the Churchill River, and has somewhat better soil conditions. It is also centrally located with respect to the forest resource, thereby minimizing wood transportation costs, and would likely involve the shortest distance for a new transmission line required from Churchill Falls.

Its major disadvantage, of course, is that it would necessitate the trans-shipment of product to North West Point for shipping and the construction of additional warehousing and handling facilities there. The section of road to Happy Valley - Goose Bay would also have to be upgraded.

Two sources of freshwater are possible in Happy Valley - Goose Bay depending on the exact site being considered: the Churchill River and the Goose River. Soil conditions are comparable to North West Point. While wood haulage and power transmission distances would be greater, product trans-shipment would be shorter. Although it is possible that shipping could be conducted through the existing dock facilities at Terrington Basin in the summer and fall and transferred to North West Point during the winter and spring, this would not be efficient considering the investment in facilities necessary at North West Point.

It was concluded that Muskrat Falls offers the most advantages or least number of disadvantages of these sites.

5.5 Concurrent Industrial Development

A key assumption in this analysis is that there would be no other major industries developed in the area concurrently which would impact on those forest industry options being considered. For example, the establishment of an aluminum smelter at North West Point in conjunction with a CTMP mill or newsprint mill at Muskrat Falls could have a positive impact on both projects by opening up the possibility of sharing certain infrastructure requirements such as power transmission facilities and new dock facilities at North West Point. Conversely, it could have a negative impact by straining the area's construction capacity leading to localized inflation.

5.6 Technology

The analysis is based on current, proven, and economically viable technology only. No attempt is made to examine new technologies being developed and their potential impact on the forest industry options under consideration.

5.7 Environmental Acceptability

It is assumed that a full Environmental Impact Statement would be required in each case as specified under Provincial environment assessment legislation. Each option would incorporate normal measures befitting a modern plant to ensure compliance with established environmental standards. While specific measures may be required to ensure the integerty of environmentally sensitive woodlands, no major portion of the forest resource would be excluded from development.

5.8 Planning Time Frame

The planning time frame begins in late 1983 and is projected in each case as follows:

- Viability studies and negotiations:	1 - 2 years
- Environmental assessment:	1.5 - 2 years
- Construction - newsprint mill	3 - 4 years
- CTMP mill	2.5 - 3 years
- sawmill (concurrent)	0.5 - 1 year

The earliest start of construction is, therefore, assumed to be early 1986 and the earliest start-up of

operations to be early 1989 for either of the newsprint mill options or mid 1988 for either of the CTMP mill options. For simplicity and comparability, however, all options are assumed to start-up in early 1989.

5.9 Markets

There are two main considerations in selling the product of any industry: can markets be identified in which the product can compete effectively and what price is obtainable for the product?

Because of the inaccessibility of the Goose Bay area by road or rail, the products under consideration are at a geographical disadvantage for competing in interior North American markets. On the other hand, its accessibility by ocean going vessels allows these products to compete effectively in tidewater markets anywhere in the world. Europe would be the logical first choice because of its size and proximity. Prospects for securing new markets in Europe for incremental newsprint production at present are poor, however, because of unlimited duty free access granted to Scandanavian producers by the EEC effective January 1, 1984. At the same time, EEC countries have decreased the quota on Canadian imports to protect their own newsprint industries from possible development of a fierce price competition.

These same Scandanavian producers, however, are facing shortages of fibre even to maintain their present production capacity which may provide opportunities for a market CTMP mill. While Newfoundland presently imports over half its lumber needs which could be largely offset by lumber produced in Labrador, this market is subject to periodic dumping by mainland producers. Also certain large dimensions of lumber would not generally be obtainable from Labrador. Europe could offer secondary or alternative markets for lumber and there is a possibility that lumber could be shipped with either CTMP or newsprint on the same vessels.

It is not the intent of this analysis to identify specific market opportunities just as it is not the intent to identify specific investors. It is assumed that such markets can be secured and that these will most likely be in Europe. Selling prices in these markets are discussed later in this report.

5.10 Ownership

It is assumed that either of the forest industry options under consideration would be operated as an independent profit centre such that unused tax credits and allowances available could not be transferred to other operations.

If this was not the case, additional cash benefits resulting from the use of these unused tax credits and allowances by other operations would have to appear as a positive cash flow credited to the Labrador operation.

6. THE MODEL

6.1 General

Due to the similarity of the projects under study, it was possible to construct only one computer model which could be used for all cases. Each case is modelled using the same basic logic but different input data. Segments of the model not applicable to a particular case are ignored by simply not entering input data for those segments.

A brief description of the modelling system and a listing of the computer program for the model with explanatory comments is given in Appendix A.

It should be noted that the model is not designed to simulate day to day operations because, at that level, operating decisions are greatly influenced by current results in a closed loop feedback system. Models of such systems are called dynamic models and exhibit characteristics which cannot be anticipated by studying their components in isolation. By contrast, this model and feasibility studies in general are concerned with much longer time frames and are based on assumptions for all future inputs. There are certain elements of this model, however, which are of a dynamic nature - for example, the calculation of tax deductions.

6.2 Time Frame of the Analysis

The time frame over which cash flows are analyzed extends from the present through to the end of the expected life of the project. In this instance, it is limited by the useful life of the original investment, i.e., the time beyond which plant and equipment have either worn out or become technologically obsolete. Other projects may have different limitations - for example, the expected life of a non-renewable resource project is determined by the extent of reserves.

Industry experience indicates that the useful life of plant and equipment for the types of projects in question is between 20 and 25 years - assuming no radical changes in the technology emerge in that time. No such changes are presently foreseen. Potential improvements in plant and equipment may be identified during this period but these must be evaluated on the basis of their attendant economic benefits and would have no effect on this analysis. Thirty years was chosen as the time frame for the analysis, however, because there are no cash flows in the first three years, i.e. prior to construction. The effective project life is only 27 years, therefore, and the effective operating life is 24 years. The analysis thus runs from 1983 to the year 2012. Because of the effect of discounting on cash flows, extend

ing the analysis further into the future would have very little impact on the results.

6.3 Accounting Conventions

Cash flows are deemed to occur at the end of each year which means that all cost and price inputs must be year end values.

Canadian dollars is the currency used throughout the analysis except that newsprint, CTMP, and lumber prices, which are normally quoted in U.S. dollars are input in that currency and subsequently converted to Canadian dollars at the forecast exchange rate(s) over the period of the analysis.

6.4 Procedure

The steps in the model are as follows:

1. Data is specified for all input variables in each period of the analysis. Costs and prices are either specified in current dollars or for some reference year, generally the base year, 1983.

2. Capital cost inputs are apportioned by asset class for depreciation and tax purposes and by year of expenditure to determine cash requirements.

3. All non-current dollar values are increased using general or specific estimates of combined inflation and escalation rates from one year to the next.

4. Production levels are determined based on maximum utilization of the available forest resource and specified process parameters.

5. Variable and semi-variable production costs are calculated followed by sales revenues and associated costs based on production levels.

6. Inventories and working capital cash requirements are calculated, followed by costs not related to production.

7. A debt financing arrangement is invoked - if required - for short term financing of working capital and long term financing of plant capital. Interest expenses, repayments and net cash requirements are calculated.

8. Pre-tax income is determined.

9. Allowable deductions for tax purposes are calculated and made to pre-tax income to yield taxable income.

10. Gross tax is determined. Investment tax credits are calculated and deducted from gross tax to yield net tax payable.

11. Operating cash flow is calculated and net cash requirements deducted to yield net cash flow.

12. Profitability measures based on discounting net cash flows are calculated.

A flow chart illustrating these steps is given in Figure 15, Appendix A.

6.5 Capital Expenditures

Lump sum capital costs are input separately for the sawmill, pulp/paper mill, woodlands section and wharf. These are apportioned in accordance with the following major asset classes recognized by tax law: buildings and structures, manufacturing equipment, non-manufacturing equipment, roads

and bridges, harvesting equipment and woodlands camps. The first three are applicable to sawmill and pulp/paper mill capital expenditures while the remainder are exclusive to the woodlands section. Wharf expenditures are considered to come under buildings and structures. This breakdown was chosen partly to correspond with the degree of refinement available in capital cost estimates.

The timber resource is not considered to be a capital asset within the project as the Province would retain ownership in order to have ultimate control over its management. The right to use timber would likely be granted for a specified period which would be renewable subject to satisfactory performance.

6.6 Inflation and Escalation

In order to arrive at cash flows in current dollars, it is first necessary to estimate the rate of increase in all cost and price inputs over the period of the analysis. Ideally, a separate forecast would be made for each cost and price input; however, it is usually more practical to group similar types together for this purpose. The model uses both general and more specialized forecasts, which are input as percentage increases from one year to the next. Costs and prices referenced to some base year are compounded by

the appropriate rate to arrive at their estimated future values before being used elsewhere. In a few instances, estimates are made and input directly in current dollars.

6.7 Production

Because the size of the resource could be a limiting factor on the viability of these options, the model is designed to be resource driven, i.e. production depends primarily on the amount of resource available. This differs from most real life situations which are market driven. In this model, it is assumed that whatever is produced can be sold. Production, however, is subject to operating rates specified in input which are meant to reflect operating and market conditions.

In a mechanical pulp mill, or in a paper mill based on mechanical pulping, most of the wood which enters the process is utilized in the finished product. Yields are typically in the range of 90-95%. Much of the residue which is in the form of bark, fines, shive, knots and the like, is recovered in modern plants as hog fuel and is burned to generate steam used in the plant, partially offsetting the need for purchased energy.

The yield of sawmills is much lower particularly in areas such as Labrador where the trees are relatively small and a large proportion may be crooked and twisted. The yield under such conditions is typically in the order of 50%. Most of the residue in this case is recoverable in the form of wood chips and is quite suitable for pulp and paper production. The viability of many sawmilling operations, depends on being able to obtain additional revenues from the sale of these wood chips to pulp and paper operations. Wood chip residues from an integrated sawmill would supplement pulpwood as a source of fibre and allow greater newsprint or CTMP production. Other residues from the sawmill such as bark and sawdust would be burned to generate steam.

Production is dependent on three characteristics of the resource - the AAC, the proportion of this which is suitable for sawmilling, and the average weighted density of the wood.

The first step is to determine the production level of the sawmill as this will also determine the amount of wood chip residues which will be available to a newsprint or CTMP mill. Consideration must be given here to the anticipated operating rate, i.e. the differences from the normal number of operating days each year and from the normal operating efficiency. The relationship is as follows:

$$SMPRD = AAC \times \%SLOG \times LY \times (SMOD/250) \times (SMEF/0.95)$$

where, SMPRD = Lumber Production (m^3/year)
AAC = Annual Allowable Cut (m^3/year)
%SLOG = Sawlog Portion of the AAC (decimal fraction)
LY = Lumber Yield (decimal fraction)
SMOD = Sawmill Annual Operating Days
SMEF = Sawmill Production Efficiency (decimal fraction)

It is anticipated that there would normally be 250 operating days each year on the basis of a five day a week, one shift per day operation and allowing for holidays and maintenance. The normal production efficiency would be 95% which means that installed capacity would be 5% greater than that permitted by the resource.

The amount of wood chips available from the sawmill then is:

$$WDCHP = (SMPRD/LY) \times WDCHPY$$

where, WDCHP = Wood Chips Available (m^3/year)
SMPRD = Lumber Production (m^3/year)
LY = Lumber Yield (decimal fraction)
WDCHPY = Wood Chip Yield (decimal fraction)

Note that wood chip yield is based on the wood entering the sawmill and not residues from lumber production.

The raw material available for newsprint or CTMP production is the amount of the AAC not suitable for lumber

plus any wood chip residues available from the sawmill. The calculation of production in this case is very similar to that for the sawmill with the exception that the conversion must be made from cubic meters to tonnes and that consideration must be given to product water content and the possible addition of chemical pulp to newsprint for quality reasons. Chemical pulps are often mixed with mechanical pulps in making paper because of their longer fibres which improve the strength of the product. Thus,

$$PMPRD = ((AAC \times (1-\%SLOG)) + WDCHP) \times WDDEN \times PY \times (PMOD/350) \times (PMEF/0.95)/((1-CP) \times (1-WTR))$$

where, PMPRD = Pulp/Paper Production (tonnes/year)
AAC = Annual Allowable Cut (m^3/year)
%SLOG = Sawlog Portion of the AAC (decimal fraction)
WDCHP = Wood Chips Available (m^3)
WDDEN = Wood Density (oven dry tonnes/m^3 green volume)
PY = Pulp/Paper Yield (decimal fraction)
PMOD = Pulp/Paper Mill Operating Days
PMEF = Pulp/Paper Mill Production Efficiency (decimal fraction)
WTR = Pulp/Paper Water Content (decimal fraction)
CP = Paper Chemical Pulp Content (decimal fraction)

This would be a 24 hour a day, year round operation which after allowing for holidays and maintenance would mean about 350 operating days per year normally. Again, the normal production efficiency is anticipated to be 95%.

The amount of sawlogs and pulpwood used and their total is then calculated backwards from the production figures in order to determine unit costs for harvesting and to allocate harvesting costs between the sawmill and the pulp/paper mill.

6.8 Variable and Semi-Variable Production Costs

Production costs are classed as either variable, semi-variable or fixed. Variable costs are those which are directly proportional to production levels while fixed or overhead costs are normally incurred irrespective of production levels. Semi-variable costs, as the term implies, exhibit characteristics of both variable and fixed costs depending on the circumstances.

Variable production costs in a pulp/paper mill are: wood, supplementary chemical pulp (if required), power, fuel, labour, chemicals, packaging materials, and replacement parts.

The cost of harvesting and transporting wood to a mill yard is considered in the same terms as if it was a purchased commodity. It is first determined on a per cubic meter basis and then translated into a cost per unit of product using pulp/paper mill and sawmill operating parameters. The

variable costs involved in harvesting and transporting wood are: fuel, replacement parts, labour and stumpage. Stumpage is a form of Provincial tax levied on each cubic meter of wood harvested and is meant to offset the cost to the Province of providing general forestry services. Rates are higher for sawlogs compared to pulpwood and in areas serviced by access roads provided by Government; however, a single representative figure is used in the model. All these costs are input directly in terms of $/m because of the way in which the harvesting costs were developed. Semi-variable costs consist of management and office staff while fixed costs are for forest management, insurance, and book depreciation on capital assets. Salaries cost is determined as the product of the number of salaried employees and the average annual salary including benefits. Forest management costs encompass silvicultural work carried out by the company involved and land taxes collected by Government and used to offset the cost of providing forest fire and insect protection. These are input as a yearly aggregate amount. Woodlands insurance is applicable only to camps and mobile equipment. Extrapolating from insurance costs in some known situations, it is calculated in the model as 2.5% of the initial capital cost of these assets and increases each year. Book depreciation, as distinguished from tax depreciation or capital cost allowance (CCA), is not used in

calculating cash flows but is included solely for developing product costs for comparison with prices and possibly with product costs for other locations. All woodlands assets are lumped together for this purpose and depreciated at 30% declining balance which is common practice in the industry. Overhead costs are summed and divided by the total wood harvested to get their value in $\$/m^3$. This in turn is added to direct costs to get the total cost of wood in $\$/m^3$ delivered to the mill yard.

The cost of wood per finished tonne of pulp or paper is calculated using the following equation:

$$PM\$WD = ((PLOG + WDCHP) \times \$WD)/PMPRD$$

where, PM$WD = Pulp/Paper Mill Wood Cost ($/tonne)
PLOG = Pulpwood Usage (m^3/year)
WDCHP = Wood Chips Available (m^3/year)
$WD = Wood Cost ($/m^3)
PMPRD = Pulp/Paper Production (tonnes/year)

Wood chip residues from the sawmill are deemed to have the same cost as logs.

The other variable cost components in pulp and paper operations are: supplementary chemical pulp (if required), power, fuel, labour, chemicals, packaging materials and

replacement parts. Supplementary chemical pulp requirements are specified as a percentage of the oven dry fibre content of the finished product. The actual amount of chemical pulp used is then calculated and multiplied by the market price for the grade of pulp purchased. The calculation must take into account any chemical pulp losses incurred in the process and the fact that market pulp prices are quoted in air dry tonnes (ADT), i.e. it contains 10% water and only 90% fibre. The equation then is:

$$PM\$CP = \frac{CP \times \$CP}{0.9 \times (1-CPLS)}$$

where, PM$CP = Paper Mill Chemical Pulp Cost ($/tonne)
CP = Paper Chemical Pulp Content (decimal fraction)
$CP = Chemical Pulp Price ($/ADT)
CPLS = Chemical Pulp Loss (decimal fraction)

Electricity cost is the product of the electricity usage for a particular option in mWh/tonne and the electricity price in $/mWh. Similarly, fuel cost is the product of fuel usage for a particular option in litres/tonne and the fuel price in $/litre.

Labour cost is calculated as follows:

$$PM\$LBR = (PMLBR \times 2080 \times PMWG \times (PMOD/350))/PMPRD$$

where, PM$LBR = Pulp/Paper Mill Labour Cost ($/tonne)
PMLBR = No. of Pulp/Paper Mill Hourly Workers

PMWG = Pulp/Paper Mill Average Wage & Benefits ($/hr.)

PMOD = Pulp/Paper Mill Annual Operating Days

PMPRD = Pulp/Paper Production (tonnes/year)

Hourly workers include both operating and maintenance employees; 2080 is the anticipated normal number of hours worked per employee a year. Note that labour input is dependent on the number of operating days a year but not on operating efficiency.

Costs for chemicals, packaging materials, and replacement parts are input individually in terms of $/tonne; an allowance for miscellaneous items is included under packaging materials.

The only cost for a pulp/paper mill considered to be semi-variable is that for management and office staff salaries, and is calculated similar to its counterpart in the woodlands section.

Variable and semi-variable cost components for a sawmill are much the same as those for a pulp/paper mill with only a few differences: the requirement for supplementary chemical pulp is, of course, not applicable; there is no significant amount of chemicals, packaging materials or miscellaneous items used; and the equation for calculating the wood cost component is modified as follows:

$SM\$WD = ((SLOG - WDCHP) \times \$WD) / SMPRD$

where, SM$WD = Sawmill Wood Cost ($/m^3)
SLOG = Sawlog Usage (m^3/year)
WDCHP = Wood Chips Available (m^3/year)
$WD = Wood Cost ($/m^3)
SMPRD = Lumber Production (m^3/year)

6.9 Sales

Sales are deemed to be equivalent to production in any given year and, therefore, gross revenue is the sum of production times selling price per unit for the sawmill and pulp/paper mill. Selling costs are those for sales staff and related overhead expenses, the cost of trucking product from the Muskrat Falls site to the wharf at North West Point, ocean shipping, loading, unloading and delivery. The cost of sales staff and related overhead is input as a fraction of gross revenues and depends on the nature and extent of the marketing effort required. Trucking and shipping costs including handling are input separately as yearly aggregates in current dollars per tonne as this is the way in which the estimates were developed. Lumber volumes are converted to weight to calculate applicable transportation and handling costs at 2.5 m^3/tonne which is approximately the volume occupied per tonne of pulp or paper.

6.10 Inventories and Working Capital

Working capital is the cash required to carry inventories and accounts receivable less accounts payable. For

the purpose of calculation, inventories are broken down into four categories: spare parts, wood, other raw materials, and finished goods. Inventories are valued at their average level over each year - not at their year end level. Inventory levels for input commodities such as wood, fuel, etc. (excluding spare parts) are specified in terms of the number of days of operation which can be sustained at the average rate of consumption for the commodity. Similarly, product inventory levels are specified in terms of the number of days production on hand at the average rate of production. This facilitates examination of any potential cost penalty imposed by the length of the shipping season. Based on estimates obtained for existing Canadian mills, the value of spare parts inventories carried in the first year of operation is calculated as 1.5% of the initial capital cost for a pulp/paper mill and sawmill. This value increases each year thereafter. Thus any penalties in capital costs associated with locating in Labrador are also shared by this item. For the other categories, the average inventory carried, in days, is divided by 365 days/year and multiplied by the total cash paid out under each category in a year to obtain the amount of money tied up in inventory on average.

Wood inventory is valued based on variable and semi-variable costs incurred is as follows:

$$\$WDINV = (WDINV/365) \times (((PLOG + SLOG) \times WD\$VAR \times 0.82) + WD\$SAL)$$

where, $WDINV = Wood Inventory Value ($/year)
WDINV = Average Wood Inventory (days/year)
PLOG = Pulp Log Usage (m^3/year)
SLOG = Saw Log Usage (m^3/year)
WD$VAR = Wood Variable Cost ($/$m^3$)
WD$SAL = Woodlands Salaries Cost ($/year)

Only 40% of wood inventories are deemed to be in the mill yard and valued at 100% of the cost to that point. The remaining 60% is at various stages in the harvesting system and is valued at 70% of the final cost. The weighted average value of all wood inventories is therefore ((0.4 x 1.0) + (0.6 x 0.7)) = .82 or 82% of the cost delivered to the mill yard.

Inventories of other raw materials are: fuel used in the woodlands section; chemical pulp (if required), fuel, chemicals and packaging materials used in the pulp/paper mill; and fuel used in kilns to dry lumber. They are valued on the basis of costs for purchases as follows:

$RMINV = (RMINV/365) x (((PLOG + SLOG) x WD$FL)
+ (PMPRD x (PM$CP + PM$FL + PM$CHM + PM$PKG))
+ (SMPRD x SM$FL))

where, $RMINV = Other Raw Materials Inventory Value ($/year)
RMINV = Other Raw Materials Inventory (days/year)
PLOG = Pulpwood Usage (m^3/year)
SLOG = Sawlog Usage (m^3/year)
WD$FL = Woodlands Fuel Cost ($/$m^3$)
PMPRD = Pulp/Paper Production (tonnes/year)
PM$CP = Paper Mill Chemical Pulp Cost ($/tonne)
PM$FL = Pulp/Paper Mill Fuel Cost ($/tonne)
PM$CHM = Pulp/Paper Mill Chemicals Cost ($/tonne)
PM$PKG = Pulp/Paper Mill Packaging Materials Cost ($/tonne)
SMPRD = Lumber Production (m^3/year)
SM$FL = Sawmill Fuel Cost ($/m^3)

Finished goods inventories are valued on the basis of variable and semi-variable costs incurred for the pulp/paper mill and the sawmill, i.e.

$$\$FGINV = (FGINV/365) \times ((PMPRD \times PM\$VAR) + (SMPRD \times SM\$VAR) + PM\$SAL + SM\$SAL)$$

where, $FGINV = Finished Goods Inventory Value ($/year)
FGINV = Finished Goods Inventory (days/year)
PMPRD = Pulp/Paper Production (tonnes/year)
PM$VAR = Pulp/Paper Mill Variable Cost ($/tonne)
SMPRD = Lumber Production (m^3/year)
SM$VAR = Sawmill Variable Cost ($/$m^3$)
PM$SAL = Pulp/Paper Mill Salaries Cost ($/year)
SM$SAL = Sawmill Salaries Cost ($/year)

Accounts receivable represents the average amount of sales revenue outstanding and is calculated in much the same way as inventories are valued:

$$\$ACREC = (ACREC/365) \times \$SALES$$

where, $ACREC = Value of Accounts Receivable ($)
ACREC = Average Delay in Receiving Payments on Sales (days)
$SALES = Total Value of Sales ($)

and the average delay in receiving payments is specified in input.

The value of accounts payable represents working capital which is not required because of time lags in paying

for costs incurred in the production of finished goods and is, therefore, calculated similarly:

$$\$ACPAY = (ACPAY/365) \times ((PMPRD \times PM\$VAR) + (SMPRD \times SM\$VAR) + PM\$SAL + SM\$SAL))$$

where, $\$ACPAY$ = Value of Accounts Payable ($/year)
$ACPAY$ = Average Delay in Making Payments on Finished Goods (days/year)
$PMPRD$ = Pulp/Paper Production (tonnes/year)
$PM\$VAR$ = Pulp/Paper Mill Variable Cost ($/tonne)
$SMPRD$ = Lumber Production (m^3/year)
$SM\$VAR$ = Sawmill Variable Costs ($/$m^3$)
$PM\$SAL$ = Pulp/Paper Mill Salaries Cost ($/year)
$SM\$SAL$ = Sawmill Salaries Cost ($/year)

The change in working capital from year to year is the cash requirement for this component. Capital expenditures must be added to this to determine total cash requirements.

6.11 Fixed Costs

Overhead cost items for a pulp/paper mill and sawmill are insurances, property tax and book depreciation.

Insurance premiums are estimated on the basis of average figures for Canadian industry at 0.5% of the total of capital costs and the value of inventories for the pulp/paper mill and sawmill and are increased yearly. Note that the wharf is also insured but that this cost in not included

in overheads for either a pulp/paper mill or sawmill in determining product costs. Rather, it appears as a non-operating cash flow expense on the cash flow statement.

Property taxes or grants to municipalities paid by the three existing pulp and paper mills in Newfoundland range between $300,000 and $1,000,000. A Muskrat Falls/North West Point operation would not fall within any present municipal boundaries; however, as the town of Happy Valley - Goose Bay will be directly affected and may lobby for such a tax or grant, a rate of 0.25% of total capital cost, again increased yearly, has been included.

Again, book depreciation is only used to generate comparative product costs and does not contribute to the calculation of cash flows. The method used is 5% straight line depreciation, which is the common industry practice in this instance.

6.12 Debt Financing

The base case analysis assumes that these projects will be 100% equity financed, however, most projects are not financed this way. In general, if the ROR on 100% equity is greater than the interest rate for borrowed money, it makes

sense to take on debt and increase leverage on the investment. This may even be true for interest rates somewhat above the ROR on 100% equity because interest is deductable from taxable income. A debt financing capability has therefore, been built into the model for use in later stages of the analysis.

In accordance with normal accounting convention, debt financing is considered either short term or long term. Short term financing is deemed to be drawn from an operating line of credit as required and fully repaid within a year along with interest, compounded monthly. It is applied solely to working capital cash requirements for inventories and accounts receivable net of accounts payable. The percentage to be financed in this way and the interest rate(s) are specified in input.

Long term financing is used in the model to pay a portion of initial capital costs, i.e. those incurred prior to start-up. Ongoing cash requirements after start-up for roads and bridges and for replacement of harvesting equipment, however, are paid out of operating revenues. Long term debt is deemed to be in the form of loans or mortgages having equal, blended payments based on monthly compounding rather than semi-annual compounding which is also common in Canadian mortgages. The percentage of capital costs to be

covered by long term financing as opposed to inputs of cash equity by the investor is specified in input to the model as well as the interest rate(s). No payments are made prior to start-up as there are no operating revenues from which to draw and, therefore, the investor would have to increase his equity contribution beyond the specified percentage. Interest accruing during this period is capitalized and added to the principal owing. All debt must be repaid within the time frame of the model for the analysis to be valid. Moreover, any long term financing agreement will certainly require repayment in full within the expected life of the project if not earlier. Consequently, all long term financing is based on a 20 year repayment period which means that the last payment is in the year 2008.

The appropriate level of both short and long term financing must be determined by trial and error because their combined effect may exceed desirable norms. Two measures are provided in the model to help in this process - current ratio and debt/net assets ratio. Current ratio - computed by dividing current liabilities into current assets - is the most commonly used measure of short term solvency, i.e. it indicates the extent to which claims of short term creditors are covered by assets which are expected to be converted to cash before the claims are due. Specifically,

$$CR = \frac{\$INV + \$ACREC}{CPLTD + STD + \$ACPAY}$$

where, CR = Current Ratio
$INV = Value of Inventories ($)
$ACREC = Value of Accounts Receivable ($)
CPLTD = Current Portion of Long Term Debt ($)
STD = Short Term Debt ($)
$ACPAY = Value of Accounts Payable ($)

The current ratio should never be less than 1.0 and the norm for the industry is about 1.6. Debt/net assets ratio measures the share of risk borne by creditors relative to the investor/owner and the leverage with which the latter exerts control and stands to profit on its equity.

$$D/A = \frac{LTD + STD}{\$CAP - \$DEP + \$INV + ACREC}$$

where, D/A = Debt/Net Assets Ratio
LTD = Balance Owing on Long Term Debt ($)
STD = Short Term Debt ($)
$CAP = Accumulated Capital Expenditures ($)
$DEP = Accumulated Depreciation ($)
$INV = Value of Inventories ($)
$ACREC = Value of Accounts Receivable ($)

The norm for the industry ranges between 0.0 and 0.6. This is used rather than debt/equity ratio as the latter requires a knowledge of the disposition of future earnings to determine equity, i.e., whether it is to be retained or declared as dividends.

Actual cash outlays for interest on both short term and long term debt are deducted from pre-tax income. Repayment of principal becomes a cash requirement to be deducted from operating cash flow. Net cash requirements in any year, therefore, are equal to the sum of capital costs and additions to working capital less cash inflows from short and long term debt plus any repayment of long term debt.

6.13 Corporate Tax

Pre-tax income is simply gross revenues less operating and sales expenses, property tax, insurance premiums not otherwise accounted for and interest on debt. Book depreciation, which was included in operating expenses, must be added back at this point as this is actually an after tax expense and does not enter into the calculation of cash flow. If the result is negative, it is a loss.

Corporate taxes are calculated as a percentage of taxable income i.e. pre-tax income less any deductions permitted by tax law. The model takes into account the three most important deductions: capital cost allowance (CCA), operating losses of other years, and inventory allowance.

CCA is depreciation on capital assets recognized by tax law as distinguished from book depreciation which is an

accounting practice used within a company to charge off the loss in value of capital assets over time against revenue. CCA may vary as required to reduce taxable income up to specified maximum rates for individual asset classes whereas book depreciation is usually constant. The maximum CCA rates applicable in the model are as follows:

Tabel 3 - CAPITAL COST ALLOWANCE (CCA) SCHEDULE

Assets	Class	Method[1]	Rate
Buildings & Structures	6	D.B.	10%
Manufacturing Equipment	29	S.L.	(Yr.1) 25%
			(Yr.2) 50%
			(Yr.3) 25%
Non-Manufacturing Equipment	8	D.B.	20%
Woodlands Camps	10	D.B.	30%
Harvesting Equipment	10	D.B.	30%
Roads & Bridges	17	D.B.	8%

1. D.B. - Declining Balance; S.L. - Straight Line.

Under the straight line method, depreciation is always a percentage of the initial capital value whereas under the declining balance method, it is a percentage of the undepreciated balance. Consequently, the amount of CCA available can accumulate under the former but not the latter. In either case, the value of depreciable assets is deemed to be reduced by the amount of any government grants or tax credits for CCA purposes. Any unused CCA can be carried forward indefinitely.

Operating losses in the five years immediately preceeding a given year or in the year immediately following may also be used to reduce taxable income. Because of operating assumptions, however, no situations should arise in this analysis where a loss could be carried back. To simplify construction of the computer program, therefore, the model only carries losses forward.

Inventory allowance provides for up to 3% of the opening value of all inventories to be deducted from taxable income. This calculation is somewhat construed in the model, however, because inventories are valued at their average yearly level using year end costs and prices and not at their opening value. Unlike CCA and operating losses of other years, inventory allowance can only be used in the year for which it is calculated.

The projects under study may also qualify for Federal investment tax credits which allow a specified percentage of capital expenditures on certified property to be deducted directly from tax payable. The investment tax credit normally applicable in Newfoundland is 20%, however, a special tax credit of 50% is offered in Labrador as incentive for industries to locate or expand there. This higher tax credit is due to expire in 1985. Certified property is interpreted to include assets classed in the model as

manufacturing equipment. An investment tax credit may be applied in full against the first $15,000 of Federal tax otherwise payable and against one-half of any excess up to the extent of available unused tax credits. Unused tax credits can be carried forward up to five years. No provision is made for using tax credits in preceeding years.[1]

Since the amount of any investment tax credit used will reduce the deemed value of assets for CCA purposes, an inter-dependent relationship exists between Federal tax payable, taxable income, CCA, the deemed value of assets and investment tax credits. Therefore, the maximum investment tax credit useable in a given year must be calculated using the following formulas:

If Federal tax otherwise payable is less than or equal to $15,000:

$$x = \frac{a(b-e-cd)}{1-ac}$$

If Federal tax otherwise payable is greater than $15,000:

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1. Since this model was developed, changes have been made to the regulations governing the use of investment tax credits: 1. available tax credits can now be applied in any amount up to the level of tax payable, 2. investment tax credits can now be carried forward up to 7 years and back 3 years.

$$x = \frac{0.5(a(b-e-cd) + 15000)}{1-0.5ac}$$

where, x = maximum investment tax credit for the year.

a = Federal income tax rate (after abatement).

b = taxable income before deduction of CCA

c = weighted average rate for CCA on assets eligible for investment tax credit.

d = capital cost of eligible assets before CCA or investment tax credit.

e = CCA on undepreciated value of assets forward from previous year plus CCA on capital additions not eligible for investment tax credit.

There is considerable flexibility under tax regulations regarding the way in which tax deductions and credits can be used together to minimize tax; the optimum combination often can only be found by trial and error which may not be practical. To avoid this problem in the model, all available deductions are first used to try to reduce taxable income to nil after which investment tax credits are applied to any federal tax payable. Moreover, inventory allowance, operating losses of other years, and CCA are used in that order to ensure that any unused deductions are available as long as possible.

As this is considered a stand alone operation, unused tax deductions and credits are not transferable to other operations. If they were, the resulting reduction in taxes on these other operations should be credited to this project to reflect the added attractiveness of the investment. The ability of a company to absorb any tax deductions and credits which are unable to be utilized by a project may be an important consideration in searching out prospective investors.

The basic Federal tax rate on corporate income is 46%, however, a 10% tax credit or abatement is universally applied to compensate for Provincial corporate taxes payable and a further reduction of 6% is allowed on manufacturing and processing profits not subject to a small business deduction. To this is added a 1.5% Federal surtax making the net Federal tax rate 31.5%. The Provincial tax rate in Newfoundland on large businesses when the model was developed was 16% of taxable income. The combined Federal and Provincial corporate tax rate is, therefore, 47.5%.

6.14 Cash Flow and Minimum Investment Criteria

Cash flow from operations is simply pre-tax income (before depreciation) less corporate taxes payable. Net

cash flow is operating cash flow less total cash requirements plus the residual value of the investment at the end of the analysis.

This residual value is the amount of cash which could be expected to be recovered from the disposal of assets. The plant is fully depreciated by this point and is supposedly worthless unless there is a new influx of capital which would allow it to replace worn out equipment and continue to operate. Its salvage value as scrap would be only marginal as well because of its isolated location and distance from scrap markets. The proper residual value is the amount of working capital tied up in liquid assets, i.e. inventories and accounts receivable, in the last year of the analysis.

ROR is the most common measure of investment attractiveness in the industry and at present the minimum ROR after taxes, required on an investment ranges between 10% and 20% depending on its scale and the cost of capital to a particular company. 15% was, therefore, chosen as the nominal hurdle rate for this investment or the discount rate for calculating NPV.

7. BASE CASE INPUTS AND ASSUMPTIONS

7.1 General

Each of the forest industry options under consideration was initially evaluated for a single base case scenario.

In developing the scenarios and corresponding input data, emphasis was placed on using consistent judgement and the most reliable information available. Unsubstantive biases and safety margins were avoided so that uncertainty and risk could be kept a separate issue and dealt with properly at some later stage. Moreover, no government financial incentives were assumed beyond normal tax deductions and credits in order to determine if there is a need for such incentives and, if so, the most effective means of providing them.

7.2 Resource Parameters

Detailed information on the timber resource and its sources is provided in Chapter 3. To recapitulate the three characteristics which determine production levels:

Annual Allowable Cut (AAC)	= 360,000 m^3
Maximum Sawlog Portion	= 30%

Average Weighted Wood Density = 0.415 tonnes/m^3
(oven dry weight per unit volume of green wood)

The AAC and the average weighted wood density are, of course, constant and apply to all cases. Where a sawmill is not a consideration, no distinction is made between sawlogs and pulpwood and all of the wood is used by the pulp/paper mill. Otherwise the maximum sawlog portion is directed to lumber production as this will indicate the maximum benefit or penalty associated with an integrated sawmill.

According to the Department of Forest Resources and Lands, the AAC could only be increased on the gamble that new harvesting and silviculture technology would be developed to bring areas which are currently uneconomical to harvest into production and to increase the rate of tree regeneration. The maximum potential for this would be about 40,000 m^3 per year.

7.3 Estimates of Cost and Price Increases

A compilation of combined inflation and escalation rates used in the model is given in Table 4.

All of these were developed in conjunction with cost estimates used in the Anaconda aluminum smelter study. It

Table 4 - COST AND PRICE INCREASES AS PERCENTAGE CHANGE OVER PREVIOUS YEAR

Year	Consumer Prices	G.N.P.	Indus. Chem.	Fuel	Wages & Salaries	Bldgs & Equipt.
1984	6.6	6.7	8.7	6.5	8.0	7.0
1985	6.8	6.8	5.3	7.6	8.8	7.0
1986	6.8	6.7	6.0	9.8	8.3	7.0
1987	6.3	6.3	7.2	8.7	8.1	7.0
1988	6.0	6.0	6.8	6.9	8.0	7.0
1989	5.9	5.8	6.2	6.9	8.0	7.0
1990	6.2	6.1	6.3	6.9	8.5	7.0
1991	6.1	5.8	5.7	6.6	8.1	7.0
1992	5.9	5.8	4.3	6.6	7.9	7.0
1993	7.0	5.9	8.5	6.6	7.9	7.0
1994	7.3	6.0	5.9	6.6	8.1	7.0
1995	6.1	5.8	2.4	6.6	7.8	7.0
1996	6.3	5.6	5.6	6.6	7.8	7.0
1997	7.0	5.8	5.8	6.6	7.9	7.0
1998	6.7	5.8	7.4	6.6	7.8	7.0
1999	6.3	6.1	6.3	6.6	7.8	7.0
2000	6.1	5.8	7.0	6.6	7.6	7.0
2001	6.1	5.7	7.0	6.6	7.6	7.0
2002	6.1	5.7	7.0	6.6	7.6	7.0
2003	6.1	5.7	7.0	6.6	7.6	7.0
2004	6.1	5.7	7.0	6.6	7.6	7.0
2005	6.1	5.7	7.0	6.6	7.6	7.0
2006	6.1	5.7	7.0	6.6	7.6	7.0
2007	6.1	5.7	7.0	6.6	7.6	7.0
2008	6.1	5.7	7.0	6.6	7.6	7.0
2009	6.1	5.7	7.0	6.6	7.6	7.0
2010	6.1	5.7	7.0	6.6	7.6	7.0
2011	6.1	5.7	7.0	6.6	7.6	7.0
2012	6.1	5.7	7.0	6.6	7.6	7.0
Mean:	6.3	5.9	6.5	6.8	7.9	7.0
Average of Means: 6.7						
S.D.	0.37	0.33	1.18	0.17	0.31	0.00

was decided to avail of these because of their coincidence with this study and because the benefits of undertaking to develop new forecasts specially for this study were not considered sufficient to offset the time and resources required.

The estimates of rates of increase in consumer prices, gross national product (GNP), industrial chemical prices, fuel prices and labour rates were developed by Atlantic Richfield Corporation (ARCO), the parent company of Anaconda Aluminum. Such forecasts are regularly prepared by ARCO for the purpose of long range planning and at other times as necessary, such as for the Newfoundland aluminum smelter study. They are derived using econometric models which relate activity in various sectors of the economy but may be adjusted on the basis of market research and certain industry knowledge. Escalators for consumer prices and GNP are both used for cost items of a general nature with the distinction being that the former apply primarily to purchased goods. Note that insurances and property taxes which are calculated as percentages of initial capital costs, as discussed in the last chapter, are increased using the rates for GNP except for woodlands insurance which is increased by the rates for consumer prices.

The building and equipment escalation rates were proposed by Fenco Newfoundland Limited - Lavalin, the engineering company which developed the detailed capital cost estimates for the Anaconda aluminum smelter study. They are based on their judgement of trends in the economy, their considerable experience with large scale projects, and on local conditions.

Rates of increase in power prices, and shipping and trucking costs are discussed later in this chapter.

7.4 Capital Cost Estimates

Capital cost estimates for production facilities are based on those prepared by Sandwell Management Consultants in the Labrador Forest Industry Development Phase 1 - Project Identification Study, 1979, for a newsprint mill, TMP mill, and an integrated sawmill of similar capacities to those envisaged in this analysis. These are used because they take into account incremental costs associated with a Labrador site and compare rationally with other estimates and known costs for similar projects. Capital costs for a CTMP mill were estimated from those for a TMP mill by adding incremental cost components.

The Sandwell estimates are for the first quarter, 1979, and, therefore, required updating to fourth quarter, 1983 levels. The details of these calculations are given in Appendix B under Plant Capital.

Capital cost components were first grouped to roughly correspond with asset classes used in the model, i.e. buildings and structures, manufacturing equipment and non-manufacturing equipment. These costs include "the cost of materials and machinery, freight to the millsite, applicable taxes and the direct cost of labour employed in erection and installation".[1] Multipliers derived from Statistics Canada price indexes corresponding to these categories were applied to increase these costs to 1982, fourth quarter levels - the latest period for which statistics were available.

"All indirect costs such as the cost of contractor's supervision, purchasing, inspection, expediting, insurance, legal fees, warehousing and accounting; the cost of renting or otherwise providing construction equipment, tools and

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1. Sandwell Management Consultants Limited, Labrador Forest Industry Development, Phase I - Project Identification Study; Department of Forest Resources and Lands, Government of Newfoundland and Labrador, Vancouver; 1979; pp. 127

2. Ibid

temporary facilities; personnel costs and subsistence allowances; (and) contractors profit"[2] are grouped separately as construction overhead. The estimates also include allowances for engineering services and for contingencies to cover the cost of possible changes in process or design during engineering, construction or initial operating stages. Construction overhead, engineering services and contingencies together amount to approximately 25% of direct costs for structures and equipment in 1979 and were assumed to be in the same proportion for 1982.

Provision is also made for start-up expenses which were increased in proportion to the total increase in direct and indirect costs.

The estimates do not include dock facilities, permanent housing for employees, on-site generation of emergency or supplementary electric power, capital associated with the woodlands section, capitalized interest during construction or financing charges which might arise from the issuance of shares and debentures.

Indirect costs - i.e. construction overhead, engineering services, contingencies - and start-up expenses, were added to direct costs for buildings and structures, manufacturing equipment, and non-manufacturing equipment on a

pro-rata basis. A further 7% was applied for 1983 in line with the recommendation of Fenco Newfoundland Limited - Lavalin regarding capital cost estimates they prepared for the Anaconda aluminum smelter study.

The resulting capital costs for plant in $1983 are as follows:

Table 5 - CAPITAL COST ESTIMATES - NEWSPRINT MILL TMP MILL AND SAWMILL

($ millions, 1983)

	Newsprint Mill	TMP Mill	Sawmill
Buildings & Structures	83.2	51.6	4.9
Manufacturing Equipment	127.1	68.7	4.7
Non-Manufacturing Equipment	74.3	48.0	3.7
	284.6	168.3	13.3

The newsprint mill cost is comparable with a recent estimate of $270 million for a mill of 160,000 tonnes annual capacity proposed for Matane, Quebec. The only greenfield newsprint mill built in Eastern Canada since 1937 was one of similar size completed in 1981 at Amos, Quebec at a final cost of $190 million. This mill is not identical in concept, however, in that its fibre supply consists entirely of wood chip residues from nearby sawmills eliminating much of the cost for wood preparation and handling facilities.

There are only two market TMP mills in Canada, the newest of which was built at Quesnel, British Columbia, in 1980 at a final cost of about $100 million. It, too, depends greatly on sawmill residues for its fibre supply and is not directly comparable to the situation envisaged for Labrador. Consolidated Bathurst recently completed conversion of its kraft pulp mill at Bathurst, New Brunswick, to produce CTMP for conversion to newsprint in its mill in England. The cost of this project was about $115 million but, again, this is not indicative of greenfield costs. The Quesnel mill is currently being converted for marketing reasons to produce bleached CTMP at an estimated cost in 1982 of $11 million. Some of this may be attributable to inefficiencies in converting existing plant which would not be incurred in a new facility. The incremental capital cost of a CTMP mill over a TMP mill is also dependent on the degree of bleaching required and the bleaching process used. A medium degree of bleaching is assumed necessary for a CTMP mill in Labrador to allow flexibility in the end use of the product. Capital costs are based on a two stage system using sodium hydroxide/sodium sulphite. Industry sources place the incremental cost of this system in Labrador at about $12 million (1983) virtually all of which is associated with non-manufacturing equipment in the bleach plant. The capital cost of a CTMP mill in Labrador is therefore estimated to be:

Table 6 - CAPITAL COST ESTIMATES - CTMP MILL

($ millions, 1983)

	CTMP Mill
Buildings & Structures	51.6
Manufacturing Equipment	68.7
Non-Manufacturing Equipment	60.0
	180.3

The total plant cost for each of the newsprint mill, CTMP mill, and the sawmill were confirmed by industry sources as being appropriate at this level of analysis for a Labrador site but higher than would be anticipated in Central Canada by between 10% and 30%. The capital cost estimates prepared by Fenco Newfoundland Limited - Lavalin for an aluminum smelter at North West Point indicated that this differential in construction costs should only be in the order of 6% to 10%. If the viability of an option is sensitive to this factor, further refinement of capital costs may significantly improve its attractiveness.

Pulp/paper mill capital costs are input to the model as aggregate amounts for each option, i.e. a newsprint mill, a CTMP mill, and a sawmill. Expenditures in each year are specified as a percentage of this aggregate amount corresponding to each of the asset classes. These percentages

were developed from information obtained on similar projects elsewhere and are as follows:

Table 7 - NEWSPRINT MILL/CTMP MILL CAPITAL EXPENDITURES BY YEAR AS PERCENTAGE OF TOTAL COST

	YEAR OF CONSTRUCTION		
	1	2	3
Buildings & Structures	3.5 (12)	25.7 (88)	0 (0)
Manufacturing Equipment	6.7 (15)	22.8 (51)	15.2 (34)
Non-Manufacturing Equipment	3.9 (15)	13.3 (51)	8.9 (34)

NOTE: Figures in brackets are percentage of expenditures within asset classes. All sawmill expenditures occur in the last year of construction.

The cost of constructing additional warehouse space at dockside at North West Point for outgoing finished products and miscellaneous incoming commodities is considered to be covered by warehouse costs included in the estimates of plant capital. These provided for seven months of finished goods inventory on site plus an additional month for entrepot inventory. Since investigations and demonstration voyages initiated by the Department of Development have

shown that year round ocean shipping is feasible, however, warehouse space need only be provided for two months inventory - one month being the normal level to accommodate shipping schedules and market fluctuations and an additional month to allow for any unforeseen shipping disruptions due to abnormal ice or weather conditions. Inventory levels are discussed in more detail later in this chapter.

The cost of constructing a wharf and topside loading facilities are based on estimates prepared by Fenco Newfoundland Limited - Lavalin in conjunction with the Anaconda aluminum smelter project, the details of which are given in Appendix B under Wharf Capital. These estimates looked at two alternatives for providing two berths. Berth #1 was designed for ships up to 40,000 dwt carrying bulk cargo and liquid fuels while berth #2 was designed for ships up to 25,000 dwt carrying miscellaneous incoming commodities and outgoing finished products, i.e. aluminum. Most of the capital cost involved is for piles because of the extraordinarily poor soil conditions at North West Point. This is more pronounced in the case of berth #2 where design loading is 2500 lb/ft^2 as compared to 500 lb/ft^2 for berth #1 because of a requirement to stockpile product on the wharf prior to shipment. The difference between the two alternatives considered is that the position of the wharf is much closer to the shore in the second but requires dredg-

ing. The study showed that there was no particular advantage to alternative #2.

The cost estimate used in the model for the wharf is $34.7 million which is the cost of berth #1, alternative #1, and associated items for 1982 and increased by 7% for 1983 as before. While this estimate may not reflect specific requirements for handling and shipping pulp, paper and lumber, it was used because it takes into account costs peculiar to the site which are believed to be much more significant.

Expenditures on the wharf in each year of construction were determined in conjunction with capital costs as follows:

Table 8 - WHARF CAPITAL EXPENDITURES BY YEAR AS PERCENTAGE OF TOTAL COST

	YEAR OF CONSTRUCTION		
	1	2	3
Buildings & Structures	43.0	47.0	10.0

Plant and wharf capital costs are increased each year in the model by the rates shown under "buildings and equipment" in Table 4.

Capital and operating costs associated with the woodlands section were developed by the Department of Forest Resources and Lands based on an AAC of 360,000 m^3, 100% pulpwood, and 150 working days per year. A combined sawlog/pulpwood harvesting operation would involve some additional but undetermined labour cost for sorting logs. 150 working days is equivalent to eight operating months; harvesting would be curtailed for four months in the spring of each year because of melting snow and soft ground. This is about one month longer than experienced on the island of Newfoundland. A fairly conventional labour intensive harvesting system is assumed entailing manual felling of trees, mechanical delimbing and slashing at roadside and 8 ft. log lengths for transportation. 25% of the loggers would commute from their homes in the Goose Bay area to work while the other 75% would be housed in camps because of the distance of cutting operations from Happy Valley - Goose Bay and the expected high projection of non-resident workers.

A detailed breakdown of woodlands capital costs is given in Appendix B which is summarized below:

Table 9 - CAPITAL COST ESTIMATES - WOODLANDS SECTION

($ millions, 1983)

	All Options
Harvesting Equipment	16.6
Camps	1.8
Roads & Bridges	16.8
	35.2

Harvesting equipment costs are based on quotations by local retailers and include all applicable taxes. Discounts normally available on large purchases have been taken into account. $16.6 million (1983) is, however, only the initial cost - this equipment normally lasts only about five years and must be replaced on a continuing basis. It is therefore assumed that one-fifth of this cost on a current dollar basis will be incurred each year after the first few years of operation. The schedule is as follows:

Table 10 - HARVESTING EQUIPMENT EXPENDITURES BY YEAR AS PERCENTAGE OF INITIAL COST

Const. End	Start-up	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Etc.
100%	0%	6.6%	13.3%	20%	20%	20%

Camps include dormatory, eating and recreation buildings, and other structures such as a garage and weigh scales. All associated furnishings, equipment and services are included. Quotations were obtained based on metal clad buildings and pre-fabricating portable units. Expenditures for this item are all deemed to occur in the last year of construction, i.e. the year prior to start-up.

Estimates for roads and bridges are based on average costs actually incurred on the island of Newfoundland except for the bridge at Muskrat Falls which was estimated in conjunction with the Department of Transportation for a two lane steel structure suitable as an integral part of the future Trans-Labrador Highway. Road and bridge construction can take place, over a ten year period but must begin by the year prior to start-up to maintain continuity of fibre supply. A bridge at Muskrat Falls would take two years to complete which means that the South side of the Churchill River would not be accessible until the year after start-up. Sufficient fibre would be available from the existing woods road network on the North side, however, during this period. The schedule of road and bridge expenditures is as follows:

Table 11 - ROADS AND BRIDGES EXPENDITURES BY YEAR

($ millions, 1983)

	Const. End.	Start up	Yr.2	Yr.9	Total
Bridge at Muskrat Falls	2.5	1.3	n/a	n/a	3.8
Roads & Bridges	1.3	1.3	1.3	1.3	13.0
Total	3.8	2.6	1.3	1.3	16.8

Road and bridge construction would be contracted out.

The rate of increase in harvesting equipment costs is assumed to be in line with the consumer price index, while that for roads and bridges is assumed to correspond with the rate of increase in GNP. The rate of increase indicated for buildings and structures in Table 4 is applied to the cost of camp facilities.

7.5 Production Parameters

Base case production parameters are based on industry norms except where conditions in Labrador dictate otherwise. These parameters were determined in consultation with people in the industry and from a wide range of written material. A compilation of these parameters is given in Table 12.

Table 12 - PRODUCTION PARAMETERS

	NEWSPRINT MILL	CTMP MILL	SAWMILL
Product Water Content (by weight)	8%	10%	20% approx. (Kiln Dried)
Supplementary Chemical Pulp (by weight)	0%	N/A	N/A
Chemical Pulp Loss	1%	N/A	N/A
Product Yield on Wood	91%	90%	48%
Wood Chip Yield	N/A	N/A	38%
Annual Operating Days	350	350	250
Operating Efficiency	70% in start-up year 95% thereafter		

Water content in newsprint is determined by quality considerations but does not vary much outside the 7% to 8% range. In market pulp, however, the price is quoted in air dry tonnes (ADT) which means that a customer pays for 10% water no matter what the actual content is.

Because of the high black spruce content of the forest and its excellent characteristics as a pulp, it is believed that no supplementary chemical pulp would be required to obtain satisfactory sheet strength in newsprint produced in Labrador. This is substantiated by the fact that the recently constructed newsprint mill at Amos, Quebec is using an almost identical fibre supply in terms of species composition, density, age, etc. and to date has not had to add any chemical pulp.

Yield in the actual TMP process is about 95% and in the CTMP process about 93% because of some extra losses in precooking the wood chips. Other losses between input and output through wastage or deterioration amount to about 3%. An additional 1% loss can be expected in the paper making process.

Lumber yield depends on the size, shape, and grain of the timber as well as the equipment used in the sawmill and the skill of the sawyer. As lumber yield improves, wood

chip yield decreases. The yields used in the model are based on experience on the island of Newfoundland with similar timber and conventional medium scale sawmilling technology.

As it has been assumed that all operations would start-up at the beginning of 1989, the number of operating days in that year and every year thereafter is the normal number for the particular operation.

Operating efficiencies are normally 95% as discussed in the previous chapter, however, 70% has been assumed in the first year to allow for operator familarization and start-up problems. This level is based on start-up experience at the Stephenville newsprint mill and other locations.

7.6 Operating Cost Estimates

As mentioned previously, all costs associated with the woodlands section were developed by the Department of Forest Resources and Lands. Details of the woodlands operating cost estimates are given in Appendix C and are summarized below:

Table 13 - WOODLANDS OPERATING COST INPUTS

($1983)

Direct Labour	$14.10/$m^3$
Supplies, Parts, Services	$10.36/$m^3$
Fuel & Oil	$ 3.18/m^3
Stumpage	$ 1.56/m^3
Salaried Employees	40
Average Salary	$40,620/yr.
Forest Management	$1,600,000/yr.

Direct labour includes all hourly paid classifications; these people are taken off the payroll when harvesting operations shut down in the spring. Salaried employeees include management personnel, supervisors, and office staff. All wages are based on current union contracts in the Province while salaries are estimated from industry sources. Present benefit packages amount to 22% for hourly labour and 30% for salaried staff and are included. A further 10% has been added in recognition of the possible need for incentives to attract skilled workers in Labrador and keep them. This amounts to about $192/month for hourly labour and $308/month for salaried staff. These incentives may take the form of money, housing assistance, travel subsidies, etc. Similar types of incentives are offered in other remote northern industries including the mining and smelting operations in

Western Labrador. A direct incentive of $154/month plus housing and travel subsidies was considered to be appropriate level for Labrador in the Anaconda aluminum smelter study.

Supplies, parts and services include replacement parts for harvesting equipment, food and other camp supplies and services such as electricity and mobile telephones. Replacement parts for heavy equipment and the like are estimated to cost as much as the original purchase price over the useful life of the equipment. As this averages five years, 20% of the initial cost in current dollars is expended each year in replacement parts. Chainsaws must be replaced yearly. Camp supplies and services are estimated to total $11.00/day for each man housed in camps based on actual operating costs. This applies to only 75% of hourly workers. The consumer price index is applied to this item to increase it from year to year.

Fuel and oil costs are based on average consumption rates for each piece of harvesting equipment and current prices for petroleum products in Labrador.

Stumpage rates apply to pulpwood in areas not serviced by Government access roads. Under regulations of the Crown Lands Act (184/82), stumpage rates are specified for January

1, 1983 and are regularly adjusted by complicated formulas which relate them to the strength of pulp, paper and lumber markets, as indicated by Statistics Canada price indexes for these commodities, and to Government's money requirements, as indicated by price indexes for its expenditures on goods and services, also published by Statistics Canada. In the model, however, the rate of increase in the GNP is used to approximate this system of formulas.

Land taxes under forest management costs are determined in accordance with the provisions of The Forest Land (Management and Taxation) Act, 1974. Under this Act, forested areas deemed "unmanaged" are taxed at a much higher rate than "managed" lands as incentive for companies to improve utilization of their timber limits or free them for use by others. Estimates of this tax are based on the lower, "managed" rates. Other costs are for forest improvement work carried out by the company such as thinning, site reclaimation and replanting. Estimates are based on average unit costs experienced on the island of Newfoundland at a average level of activity as the actual level required can only be determined some time after operations commence. The rate of increase in the GNP is also assumed to apply to this item.

Operating cost inputs for the newsprint mill, CTMP mill and sawmill are as follows:

Table 14 - MILL OPERATING COST INPUTS

($1983 except as noted)

	Newsprint Mill	CTMP Mill	Sawmill
Electric Power usage	3.30 $\frac{mWh}{tonne}$	2.80 $\frac{mWh}{tonne}$	0.10 $\frac{mWh}{m^3}$
Electric Power Rate ($1989)	27 mils/kWh[1] 22 mils/kWh[2]	31 mils/kWh[1] 26 mils/kWh[2]	See 1. below
Fuel Usage	20 l/tonne	15 l/tonne	40 l/tonne
Fuel Price	0.23/l	0.23/l	0.23/l
SBK Pulp Price	US$530/ADT	N/A	N/A
Chemicals Cost	$13.00/tonne	$63.00/tonne	N/A
Packaging & Misc Cost	$9.00/tonne	$8.00/tonne	N/A
Supplies, Parts & Services Cost	$14.00/tonne	$9.00/tonne	$3.00/$m^3$
Average Wage & Benefits	$20.22/hr.	$20.22/hr.	$20.22/hr.
Salaried Employees	60	50	10
Average Salary	$43,285	$43,285	$43,285

1. Rate to integrated pulp/paper mill and sawmill
2. Rate to pulp/paper mill without sawmill

Electric power usage, fuel usage, chemicals cost, packaging and miscellaneous costs, the cost of supplies part and services, and the number of hourly and salaried employees are based on figures for similar modern operations and were determined in consultation with people in the industry and from a wide range of written material.

Electric power usage includes both process and general mill requirements. The electricity rate structure used in the base cases was developed by Newfoundland Hydro and reflects their policy of recovering the cost of providing service to its customers. The main components of this are the cost of generating electricity at the Churchill Falls hydro generating station, which is presently about 4 mils/kWh, and the carrying costs of providing and maintaining a new transmission line from there to a site near Muskrat Falls. Only a single transmission line would be required backed-up by a shunt to the existing transmission line servicing the Goose Bay area for emergency power. The rates were developed in current dollars for the first year of operation, 1989, for a 230 kV line. Annual carrying costs for transmission facilities is estimated to be about $9 million. As most of the cost of providing service is essentially fixed, i.e. independent of power usage, mill rates are higher for smaller consumers. This also means that power rates should increase very little, if at all, during the life of these

projects. Therefore, power rates are assumed in the model to be flat. The transmission line would have surplus capacity so the cost could be spread out among any other customers using these facilities in proportion to their usage.

Fuel usage is net usage after taking into account energy available from burning hog fuel and steam recovery from refiners. Price is based on quotations from oil companies for Bunker C oil delivered in shiploads to Goose Bay where it is offloaded into storage tanks and subsequently trucked to a site near Muskrat Falls. Storage tank capacity is believed to be available at Goose Bay and most of the fuel inventory could be located there.

Because of the wide variety but often small amounts of chemicals used in making pulp and paper, it is convenient to measure usage as the total cost of chemicals per unit output. Chemical usage in making newsprint is relatively small as little or no bleaching is normally required. The figures used are industry averages for Canada. Chemical usage in CTMP production is higher intrinsically but also because bleaching is generally required to compete with higher priced chemical pulps in diverse markets. The degree of bleaching depends on the requirements of the end products and is therefore, a function of the marketing thrust. The figure used here is for a moderate degree of bleaching (from

58° to 72° Elrepho) using a two stage hydrogen peroxide and hydrosulphite system and takes into account a 7% to 10% reduction afforded by the above normal brightness of pulp produced from northern black spruce. A typical use for this pulp would be as the main component in tissue papers. The details of this cost estimate are given in Appendix D. Further bleaching (72° to 76° Elrepho) would cost about $7.00 more and the resulting pulp would typically be used as a higher cost supplement to other pulps to add certain quality characteristics to the end product.

Packaging and miscellaneous cost items as well as the cost of supplies, parts and services are also industry averages for Canada both of which are increased in line with the comsumer price index.

The addition of supplementary chemical pulp in newsprint production to enhance sheet strength is not considered necessary in the base cases but is the subject of subsequent sensitivity analysis. The cost for this component is based on using semi-bleached softwood kraft pulp (SBK). SBK is commonly used for this purpose in Canadian newsprint mills - including the Abitibi-Price mill at Stephenville. A price of U.S. $530 (delivered) in 1983 increasing at 6.7% annually was estimated for the model. While actual levels in 1983 were well below this because of the recession, this situa-

tion was expected to turn around dramatically and move in line with this estimate before start-up in 1989. The 1983 figure was based in part on five year forecasts done by Data Resources Inc. for the Department of Regional Industrial Expansion (DRIE) and in part on newsprint price - discussed later in this chapter - and its historical relationship with SBK price. The 6.7% annual rate of increase corresponds to the average of the means of the rates given in Table 4 and is also discussed in more detail in the section on product prices.

The number of hourly employees does not include employees involved in trucking product from the mill site to North West Point or in warehousing and loading ships there. These costs are estimated separately and will be discussed later in this chapter. A full maintenance crew is assumed as outside services may not be available.

The basis for wages and salaries is identical to that in the woodlands section except that fringe benefits for hourly workers is the same as for salaried staff at 30%.

7.7 Selling Cost Estimates

Selling cost attributable to sales staff and related overhead are estimated by industry sources, based on their

experience, to amount to 1% of gross sales revenues assuming an independent sales organization and moderately diverse markets.

Product transportation and handling charges were estimated in current dollars per tonne and were separated into two segments - one covers the cost of trucking product from a site near Muskrat Falls to North West Point, transfer to a warehouse there, and ship loading while the other covers the cost of ocean shipping, unloading, and delivery by truck to customers. This last segment only applies to newsprint and lumber where prices are quoted on a CIF basis. CTMP prices are quoted on an FOB plant basis. The detailed calculations of these costs are shown in Appendix E and are summarized in Table 15.

Table 15 - PRODUCT TRANSPORATION AND HANDLING COSTS

($ current/tonne)

YEAR	TRUCKING, TRANSFER & SHIP LOADING	SHIPPING UNLOADING & DELIVERY
1983 (equivalent)	7.70	61.81
1989	11.57	96.45
1990	12.14	100.04
1991	12.71	103.65
1992	13.32	107.48
1993	13.97	111.59
1994	14.68	116.02
1995	15.40	120.57
1996	16.13	125.20
1997	16.94	130.28
1998	17.79	135.65
1999	18.74	141.62
2000	19.69	147.65
2001	20.69	153.91
2002	21.74	160.54
2003	22.85	167.54
2004	24.02	174.94
2005	25.27	182.76
2006	26.58	191.02
2007	27.96	199.76
2008	29.43	209.00
2009	30.98	218.76
2010	32.62	229.08
2011	34.35	239.99
2012	36.18	251.52

Shipping cost was determined in consultation with Acres Consulting Services and based on the methodology and information contained in the Lake Melville Winter Navigation Incremental Cost Study prepared by that company in 1982. This study compared estimated capital and operating costs for standard, ice strengthened and icebreaking bulk cargo vessels of various sizes in regular international commerce

to and from Goose Bay. These estimates are typical of the method by which a ship owner would evaluate costs and are believed to be more representative of long term shipping costs than spot quotations which can fluctuate widely depending on the market demand. One of the conclusions of this study was that shipping costs using icebreaking vessels is significantly less than that for merely ice strengthened vessels of the same size and only marginally greater than for standard vessels of the same size. The reason for this is that the additional capital cost for icebreaking vessels is almost offset by reduced insurance premiums. An icebreaking capability also reduces or eliminates dependence on Coast Guard icebreakers for assistance and any attendant delays in obtaining these services. No cost has been included for shore based navigational aids or vessel ice management system which would possibly be required.

The capital cost component of the estimate is for a 10,000 dwt specialized side loading vessel with icebreaking capability. As this type of ship is much bigger than a bulk cargo vessel of the same capacity, operating costs are based on a 20,000 dwt bulk cargo vessel. Such a vessel would be dedicated to this project and either owned and operated by the company or leased on a long term basis. No profit margin has been built in, however, for the leasor. If the

vessel is not fully utilized in a year, it is assumed that there is alternative charter work available.

The cost of trucking product from a Muskrat Falls site to North West Point, transferring it to the warehouse and loading it aboard ships was estimated using a similar methodology to that used for developing shipping cost and cost data analogous with that for the woodlands section.

7.8 Inventory and Other Working Capital Parameters

As mentioned in the previous chapter, the average annual level of inventories - except spare parts - accounts receivable, and accounts payable in the model is specified in terms of daily consumption/production levels, i.e. days. These are divided by 365 days/year to determine the faction of annual costs or revenues associated with each item which is tied up in working capital.

Wood inventories are assumed to be 90 days which is the level considered necessary to allow for disruptions in harvesting due to inclement weather conditions and possible labour problems.

The inventories which would be affected by any variations in the shipping season are those for other raw materials and for finished goods. Average inventories over each year for these items are approximated as follows:

$$INV = MININV + 0.5\ (MAXINV - MININV)$$

where, INV = Average Inventory Level (days)
MININV = Minimum Inventory Level (days)
MAXINV = Maximum Inventory Level (days)

It was assumed that the minimum level of inventory would be 30 days. This is the margin considered necessary to cover shipping schedules and normal market fluctuations and is typical of industry practice. The maximum inventory is assumed to be 60 days in the base case which is somewhat higher than would be encountered elsewhere in order to allow for unforeseen shipping disruptions due to abnormal ice or weather conditions. Thus the average level of inventories for these two categories in the base cases was 45 days. Increasing maximum inventories to 90 days due to shipping restrictions would raise the average inventory level to 60 days, etc.

The average delay in receiving sales revenues for calculating the value of accounts receivable is 30 days which is normally acceptable in business. Accounts payable are assumed to be paid in 15 days on average because a main

component of this is wages and salaries which are assumed to be paid weekly or biweekly.

7.9 Product Price Estimates

There is no strong concensus of opinion as to what the future holds in store for newsprint, CTMP and lumber prices. These industries are just beginning to emerge from their worst ever downturn which was precipitated by high interest rates and the resulting recession in the economy but underscored by structural changes in the sector, shifts from traditional supply and demand patterns and changes in the relative competitiveness of producers.

By the end of the first quarter of 1983, newsprint markets were very depressed and the expectation was that they would remain that way until the first or second quarter of 1984 when the market would firm up somewhat. Price cutting had rolled back the official newsprint price for the first time in history from U.S.$500/tonne to U.S.$467/tonne. Subsequent efforts to raise prices are only now beginning to take hold. This downward pressure was partially attributable to a widespread move by mainly U.S. publishers to get directly involved in new mills and expanding capacity by taking up an equity position to secure a captive source of newsprint. This was motivated essentially by non-economic

reasons. Operating rates are currently significantly higher for mills with a publishing affiliation than without. Canadian producers have been particularly hurt and have seen their traditional leadership role diminish to where the U.S. is now setting the trend in prices.

The industry has responded to this situation by taking inefficient capacity out of production. Customers generally recognize, however, that if low prices force machines, mills or even companies out of business, they will pay for it in the future. Consequently price reductions for newsprint during the recent recession have been much less than other paper grades.

As the economy improves and consumption increases, markets should tighten up.

Despite this situation, it is reasoned that newsprint prices must eventually rise as markets rebound, to where they would have been had the recent downturn not occured. This is necessary for newsprint mills - especially newer ones - to cover the costs of production and become profitable once again. If this does not happen, the most inefficient mills will be closed - as already evidenced - and supply will be brought into balance with demand with the

same upward effect on prices. Taking the 1981 price of U.S. $500/tonne CIF and applying the compounded rate of increase in GNP over the interval 1981-1983 of about 17% yields an indicated price in 1983 of US$585/tonne CIF for newsprint under this scenario. Thereafter an annual rate of increase of 6.7% which is the average of the means for all the rates shown in Table 4, is assumed. This rate is used in the absence of long range forecasts for product prices to reflect the general rate of increase in costs and prices implicit in the model. While newsprint prices may not be in line with these levels at present, it is implied that this will occur prior to start-up in 1989.

The potential effect on the quota restrictions imposed by EEC countries on Canadian newsprint imports is the real uncertainty associated with this scenario.

Similar reasoning was used to estimate CTMP prices. In this case, however, the basis price was that for bleached groundwood pulp which has been at about US$325/tonne FOB mill since 1981. Again, applying a 17% compounded rate of increase over this period yields an indicated price of US$380/tonne FOB mill in 1983. Further increases are at 6.7% annually as for newsprint. It is speculated by industry analysts, however, that if CTMP usage continues to grow at its present pace, its price will rise even more dramatically to come in line with bleached hardwood kraft pulp -

its chief competition. Bleached hardwood kraft pulp prices in 1983 were about 20% above those for bleached groundwood pulp but in 1981 this difference was as much as 50%. The potential for upward movement in CTMP prices, therefore, is very good.

The price of lumber varies with lumber size and grade, species of wood and of course, lumber markets. A distribution of lumber by size and grade was subjectively chosen based on the characteristics of the timber in FMU 19 as follows:

Table 16 - LUMBER DISTRIBUTION BY SIZE AND GRADE

Dimensions (in.)	Std./#2 & better	Utility	Total
2 x 4	32%	8%	40%
2 x 6	24%	6%	30%
2 x 8	16%	4%	20%
2 x 10	8%	2%	10%
Total:	80%	20%	100%

Published prices for kiln dryed Eastern (Canadian) SPF (spruce, pine, fir) delivered by truck to Northeastern U.S. markets was used as the benchmark for estimating the realizable price of lumber from Labrador. In early 1982, when the Canadian lumber industry was prosperous, the weighted

average price for lumber under the above distribution was about US$106/$m^3$. By mid to late 1983, the effects of the recession had reduced this to about US$94/$m^3$. Using the same logic as for newsprint and CTMP prices, the 1982 price was increased by 12% - the estimated rate of growth in GNP to the end of 1983. A further 10% was added to this in consideration of the premium Labrador wood would command in European markets and additional transportation and handling costs involved. The resulting price used in the model is US$130/$m^3$ CIF in 1983. Lumber prices in future years are also estimated by compounding at 6.7% annually.

8. RESULTS

Copies of the results of the base case computer runs are given in Appendices F to I.

The time distribution of net cash flows for each are summarized in Table 17, two of which - those for the newsprint and CTMP base cases - are graphically presented in Figures 4 and 5. All of these exhibit a normal pattern of negative investment cash flows in the early years followed by positive cash flows from operations through to the end of the analysis. This confirms the appropriateness of using discounted cash flow evaluation methods and the validity of the results obtained.

The slight decline in positive cash flows which occurs somewhere between 1992 and 1995, depending on each case, is attributable to increasing tax burden as accumulated tax benefits become depleted.

It can be seen from the base case computer printouts in Appendices F to I that very little of the available Federal investment tax credits even get used before expiring. Because tax credits provide more tax relief than deductions from taxable income, eg. CCA, on a dollar for dollar basis,

Table 17- NET AFTER TAX CASH FLOWS, BASE CASE
($ millions)

YEAR	NEWSPRINT & LUMBER BASE CASE	NEWSPRINT BASE CASE	CIMP & LUMBER BASE CASE	CIMP BASE CASE
1983	0	0	0	0
1984	0	0	0	(
1985	0	0	0	0
1986	-67.4	-67.4	-47.7	-47.4
1987	-251.9	-251.9	-158.8	-158.8
1988	-150.2	-131.5	-109.7	-91.1
1989	2.4	18.4	-9.0	-0.6
1990	48.5	68.6	20.6	31.0
1991	56.1	77.6	25.9	36.9
1992	59.0	68.6	26.7	38.5
1993	59.4	62.2	28.4	32.2
1994	50.8	64.3	30.5	32.1
1995	48.0	60.5	26.1	30.8
1996	49.3	63.2	25.9	31.7
1997	50.6	66.0	25.8	32.7
1998	55.8	72.6	29.3	37.0
1999	58.6	76.8	30.4	39.1
2000	61.9	81.6	31.8	41.3
2001	65.5	86.8	33.3	43.7
2002	69.5	92.4	35.2	46.4
2003	73.9	98.6	37.2	44.3
2004	78.7	105.2	39.4	52.5
2005	83.9	112.2	41.9	55.9
2006	89.4	119.9	44.5	59.6
2007	95.4	128.0	47.4	63.5
2008	101.9	136.8	50.5	67.8
2009	108.7	146.1	53.8	72.3
2010	116.1	156.1	57.3	77.1
2011	123.9	166.7	61.1	82.3
2012	254.6	304.3	166.2	191.4

FIGURE 4 - NET AFTER TAX CASH FLOW, NEWSPRINT BASE CASE

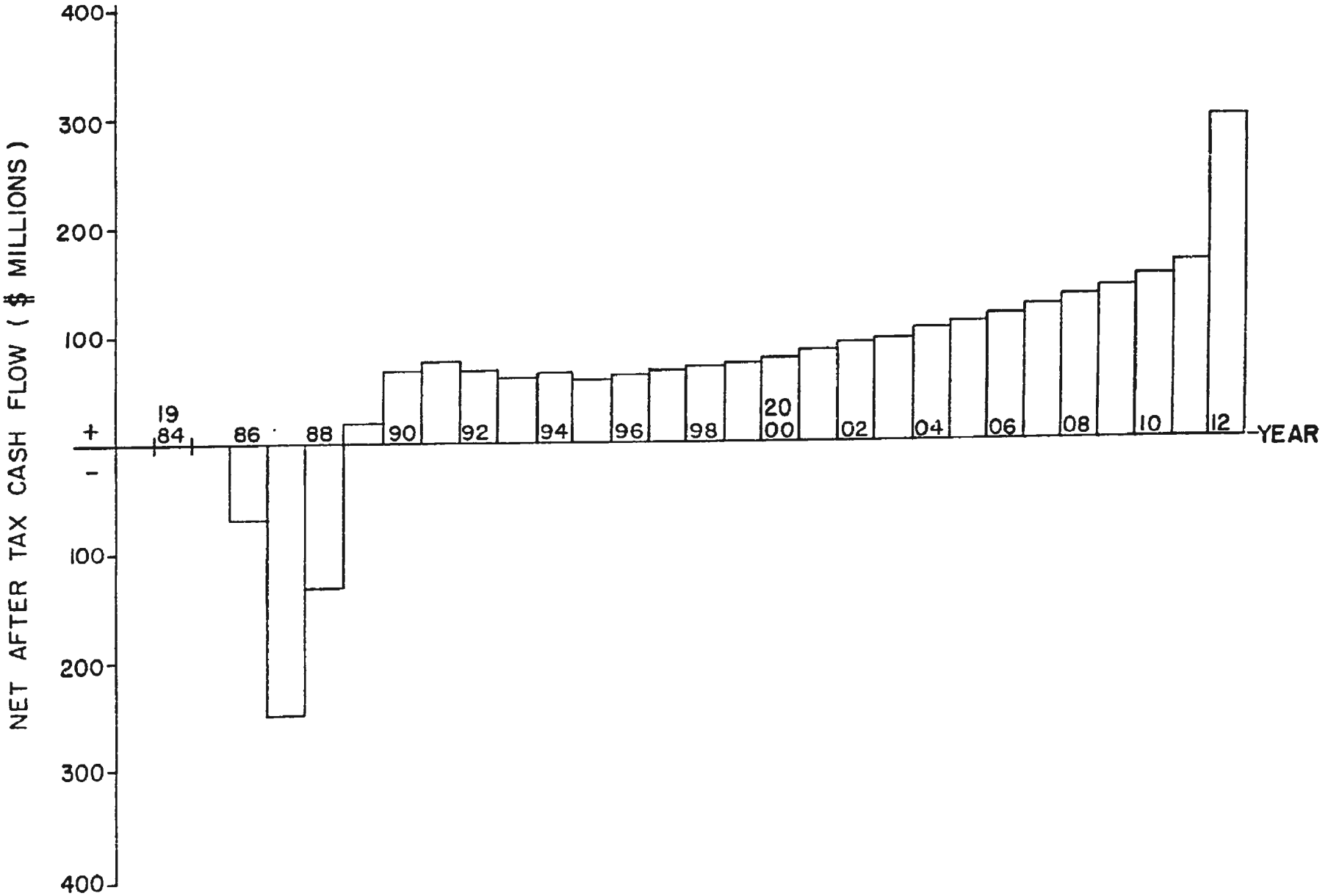


FIGURE 5 - NET AFTER TAX CASH FLOW, CTMP BASE CASE

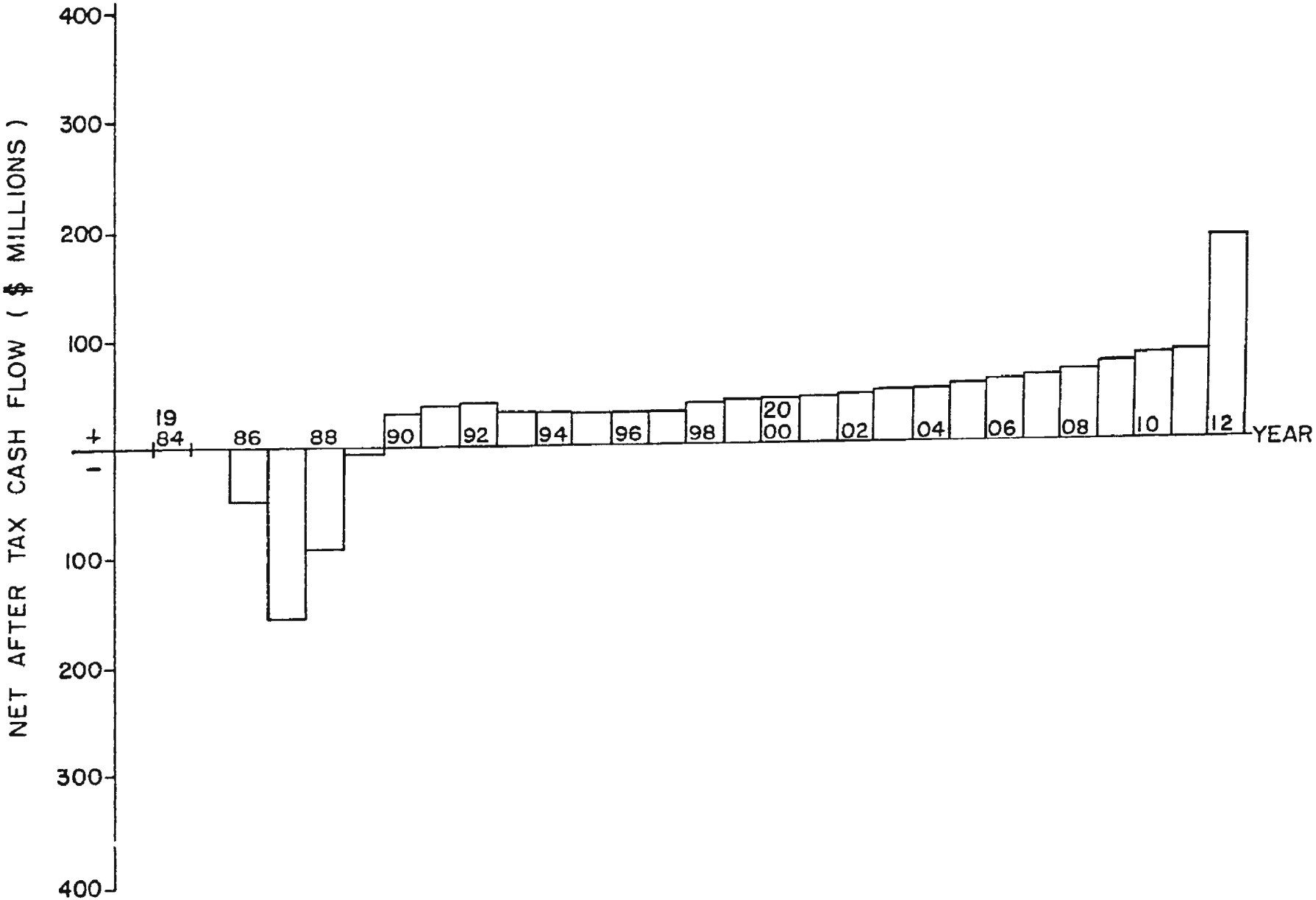


Table 18 - BASE CASE RESULTS

	NEWSPRINT & LUMBER	NEWSPRINT	CTMP & LUMBER	CTMP
R.O.R.(%)	10.3[1]	13.5[1]	7.6[2]	10.5[2]
N.P.V. ($ Millions), Discount Rate 15%	-94.9	-30.6	-97.2	-59.4
P.V. Ratio Discount Rate 15%	-0.258	-0.086	-0.386	-0.249
N.P.V. ($ Millions), Discount Rate 10%	10.1	125.4	-53.3	11.1
P.V. Ratio Discount Rate 10%	0.027	0.354	-0.212	0.047
Payback Period Years	9.8	7.5	12.7	9.9

1. The capital cost of the newsprint mill is assumed to be the same in the newsprint and lumber case as for the newsprint case even though newsprint production is about 20% less. The capital cost in this case would have to be almost 37% less than in the newsprint case for it to achieve the same rate of return. Alternatively, lumber prices would have to increase about 180%.

2. A similar assumption was made in both CTMP cases. The capital cost of the CTMP mill in the CTMP and lumber case would have to be reduced 45% to achieve the same rate of return as the CTMP case. Alternatively, lumber prices would have to increase about 97%.

it may be more beneficial to give priority to the application of tax credits over deductions in determining tax. The effect of this would, however, be mitigated because available deductions from taxable income would be reduced by the amount of any tax credits taken.

The large positive cash flow in 2012, the last year of the analysis, represents the recovery of working capital tied up at that time which is considered to be the realistic residual value of each investment.

The indicators of investment attractiveness for each of the base cases are compared in Table 18. It is apparent that under base case inputs and assumptions none of the options meets the minimum desired criteria for investment, i.e. a 15% ROR or a positive NPV using a discount rate of 15%.

With one exception, each of these indicators consistently ranks the four investments in the following order of attractiveness:

1. Newsprint
2. CTMP
3. Newsprint and Lumber
4. CTMP and Lumber

The anomaly is that the payback period of the newsprint and lumber base case at 9.8 years is slightly better than that of the CTMP base case at 9.9 years. In fact, these two base cases are virtually equal in terms of their attractiveness to investment.

The significant point of this comparison is that the integration of a sawmill with either a newsprint mill or a CTMP mill markedly detracts from these investments rather than enhancing them. The reason for this is that production from a newsprint or CTMP mill and associated gross revenues are reduced by about 20% because of the diversion of the sawlog portion of the resource to lumber production. While the capital cost of a newsprint or CTMP mill could be expected to be somewhat lower because of this decreased capacity, the amount of this reduction is unknown and, therefore, none was assumed. This results in a higher ratio of capital cost to production capacity for a newsprint or CTMP mill. In fact, it was determined that the capital cost for a newsprint mill in combination with a sawmill would have to be about 37% less than that for a newsprint mill alone for these two investments to have the same ROR. For the two CTMP options, this difference in capital cost would have to be about 45%. Such differences in the ratio of capital cost to production capacity are not realistic as

they would be contrary to economies of scale normally associated with such projects. The profit margin available from lumber production is insufficient to compensate for this decline in profitability of newsprint or CTMP production. It was further determined that the price of lumber would have to be about 180% above that assumed in order for the newsprint and lumber option to have the same ROR as newsprint alone while this difference would have to be about 97% for the CTMP options. Under these circumstances, it is better to direct as much wood to newsprint or CTMP production as possible rather than to lumber production.

It may be possible that some combination of lower capital cost for a newsprint or CTMP mill and higher lumber price could make integration of a sawmill attractive. Risk analysis would be appropriate in that event to determine if the probability of this occuring is realistic.

As it stands, however, an integrated sawmill would be attractive only if there is suitable wood in excess of that which can be efficiently utilized by a newsprint mill or CTMP mill. In that situation, it would help maximize forest resource utilization and would generate additional revenues - albeit, at a lower ROR than the rest of the operation. The optimum capacity of a modern newsprint machine is determined by current technology to be between 160,000 and

180,000 tonnes annually which is slightly greater than the capacity which can be sustained by the full AAC of FMU 19. Thus, there would be no surplus of sawlogs for lumber production. The possibility of a surplus of sawlogs with a CTMP operation is even less as equipment selection is more flexible making it easier to tailor production capacity to the size of the resource. Nevertheless, market constraints or special technological considerations may limit CTMP production to something less than maximum.

In the past, several proposals have been made to Government to establish a major sawmill in FMU 19 which have entailed the sale of sawmill residues and pulpwood to markets outside the Province. Besides the historical problem of securing stable markets for this fibre, the export of raw wood is undesirable from Government's point of view because of the low level of value added in the Province. The proposals have attempted to rationalize this on the grounds that it would only be a temporary situation and that after a sawmill operation is well established, a pulp or paper mill could be added to process this wood locally. The results of this analysis indicate, however, that if a major sawmill is first developed at Goose Bay, the economics of a newsprint mill or CTMP mill would be less attractive and it is less likely that either of these would be develop-

ed. These points should be considered in Government's policy toward such proposals in the future.

Because of these arguments, it was decided to eliminate the sawmill options from further consideration and to concentrate on newsprint and CTMP by themselves.

Further analysis was concerned with the following questions:

1. What is the relative importance of each of the main components in the analysis in determining measures of investment attractiveness?

2. What are the implications for this analysis of the known potential for variation in these components?

3. What measures are available to Government and prospective developers to make these investments sufficiently attractive?

4. What criteria can be extracted from this analysis for identifying economic conditions conducive to development and the most suitable investors?

Components of interest in both the newsprint base case and the CTMP base case were subjected to sensitivity analysis. Tables 19 to 24 show the effect of percentage changes in major costs and prices on ROR and NPV. Those of particular interest are plotted in Figures 6 to 11. Note that the capital cost of roads and bridges is accounted for in wood cost and is not combined with that for plant and wharf so that the sensitivity graphs are additive. Woodlands labour and salaries are also included in wood cost and, for the same reason, are kept separate from mill wages and salaries.

Note also that a nil product price in each case, i.e. newsprint price; CTMP price, would result in an ROR of negative infinity because there would only be negative cash flows. Similarly, if capital costs were nil and there were no negative net cash flows from operations, the ROR would be positive infinity because there would only be positive cash flows. These situations would, however, result in finite NPV's in each case. The slightly non-linear response of NPV to changes in product price and plant and wharf capital is attributable to the way in which tax deductions and tax credits are used.

Table 19 - NEWSPRINT BASE CASE SENSITIVITY ANALYSIS, RATE OF RETURN (%)

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		20.4	18.4	17.1	15.7	14.5	13.5	12.6	11.9	11.2	10.5	10.0
Wharf Capital Cost	14.7											
Roads & Bridges Capital Cost	13.9											
Wood Cost		15.6	15.2	14.8	14.4	13.9	13.5	13.1	12.7	12.3	11.8	11.4
Mill Wages & Salaries		15.1	14.8	14.5	14.2	13.8	13.5	13.2	12.9	12.6	12.2	11.9
Total Wages & Salaries		15.9	15.5	15.0	14.5	14.0	13.5	13.0	12.5	12.0	11.4	10.9
Power Cost (flat)	14.5	14.0	13.9	13.8	13.7	13.6	13.5	13.4	13.3	13.2	13.1	13.0
- inc. 6.7%/yr	14.5		13.1		12.7		12.2		11.7		11.2	
Chemicals, Pkg. Mat, Oper. & Main. Supplies		14.1	14.0	13.9	13.8	13.6	13.5	13.4	13.3	13.2	13.1	13.0
Shipping Cost		14.3	14.2	14.0	13.9	13.7	13.5	13.4	13.2	13.0	12.9	12.7
Newsprint Price		Neg.	1.4	5.5	8.6	11.2	13.5	15.6	17.5	19.1	20.8	22.3
Prov. Corp. Tax	15.4	14.5	14.3	14.1	13.9	13.7	13.5	13.3	13.1	12.9	12.7	12.4

FIGURE 6 - NEWSPRINT BASE CASE SENSITIVITY ANALYSIS, RATE OF RETURN

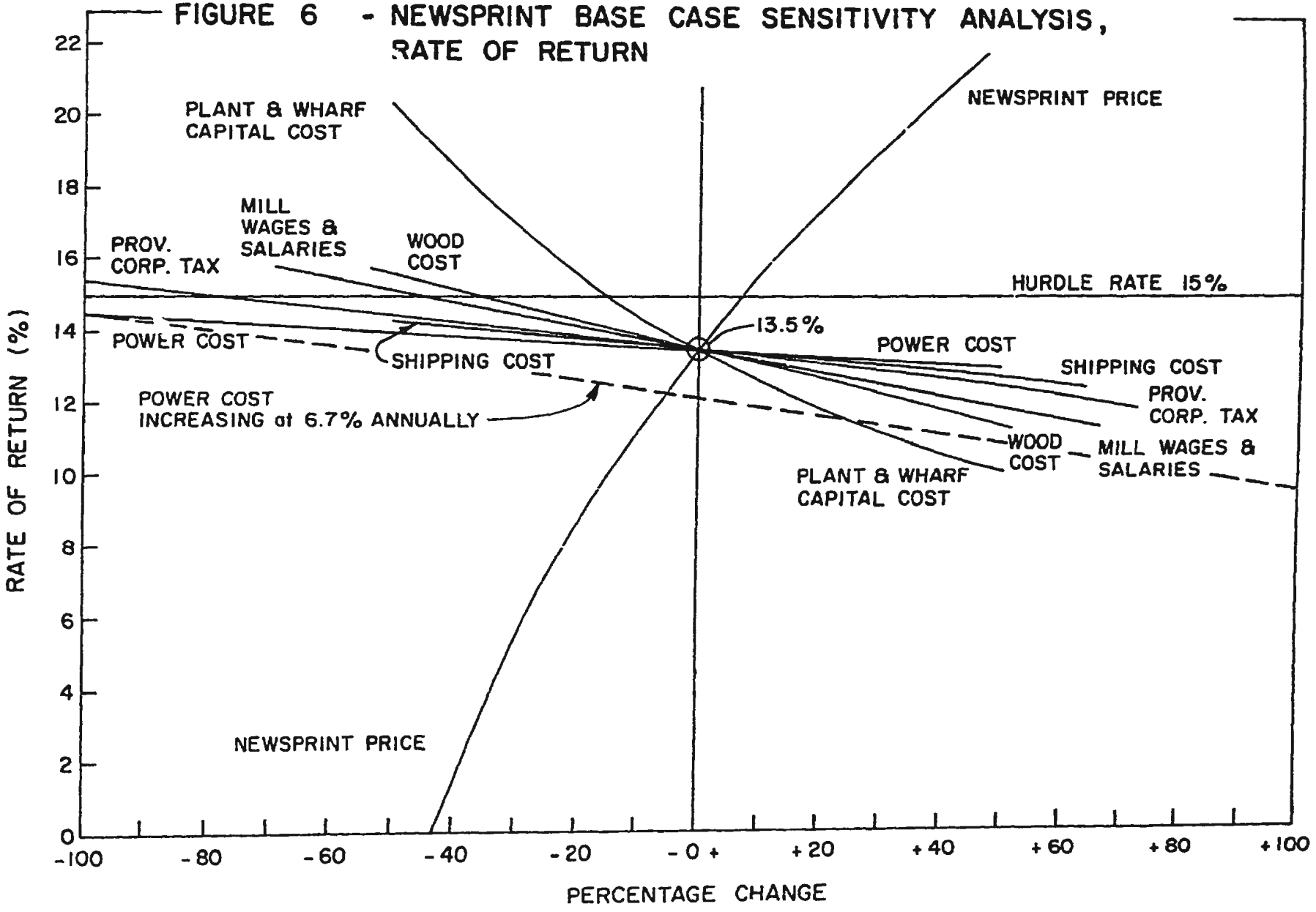


Table 20 - NEWSPRINT BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE ($ MILLIONS), DISCOUNT RATE 15%

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		69.1	49.4	33.8	12.7	-8.8	-30.6	-52.3	-74.2	-96.5	-118.7	-140.9
Wharf Capital Cost	-6.0											
Roads & Bridges Capital Cost	-21.9											
Wood Cost		11.6	3.4	-5.1	-13.6	-22.1	-30.6	-39.1	-47.6	-56.0	-64.7	-73.4
Mill Wages & Salaries		1.8	-4.7	-11.2	-17.7	-24.1	-30.6	-37.1	-43.5	-50.0	-56.5	-62.9
Total Wages & Salaries		19.5	9.7	-0.4	-10.5	-20.5	-30.6	-40.7	-50.7	-60.8	-71.1	-81.4
Power Cost (flat)	-9.8	-20.2	-22.3	-24.4	-26.5	-28.5	-30.6	-32.7	-34.8	-36.8	-38.9	-41.0
- inc. 6.7%/yr.	-9.8		-37.7		-46.9		-56.2		-65.4		-74.9	
Chemicals, Pkg. Mat., Oper. & Main. Supplies		-19.3	-21.6	-23.8	-26.1	-28.4	-30.6	-32.9	-35.1	-37.4	-39.6	-41.9
Shipping Cost		-13.8	-17.2	-20.5	-23.9	-27.3	-30.6	-34.0	-37.3	-40.7	-44.0	-47.4
Newsprint Price		-296.5	-225.3	-169.4	-121.1	-75.1	-30.6	13.3	56.3	94.2	135.4	176.3
Prov. Corp. Tax	9.0	-10.8	-14.8	-18.7	-22.7	-26.7	-30.6	-34.6	-38.5	-42.5	-46.5	-50.4

FIGURE 7 - NEWSPRINT BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE , DISCOUNT RATE 15 %

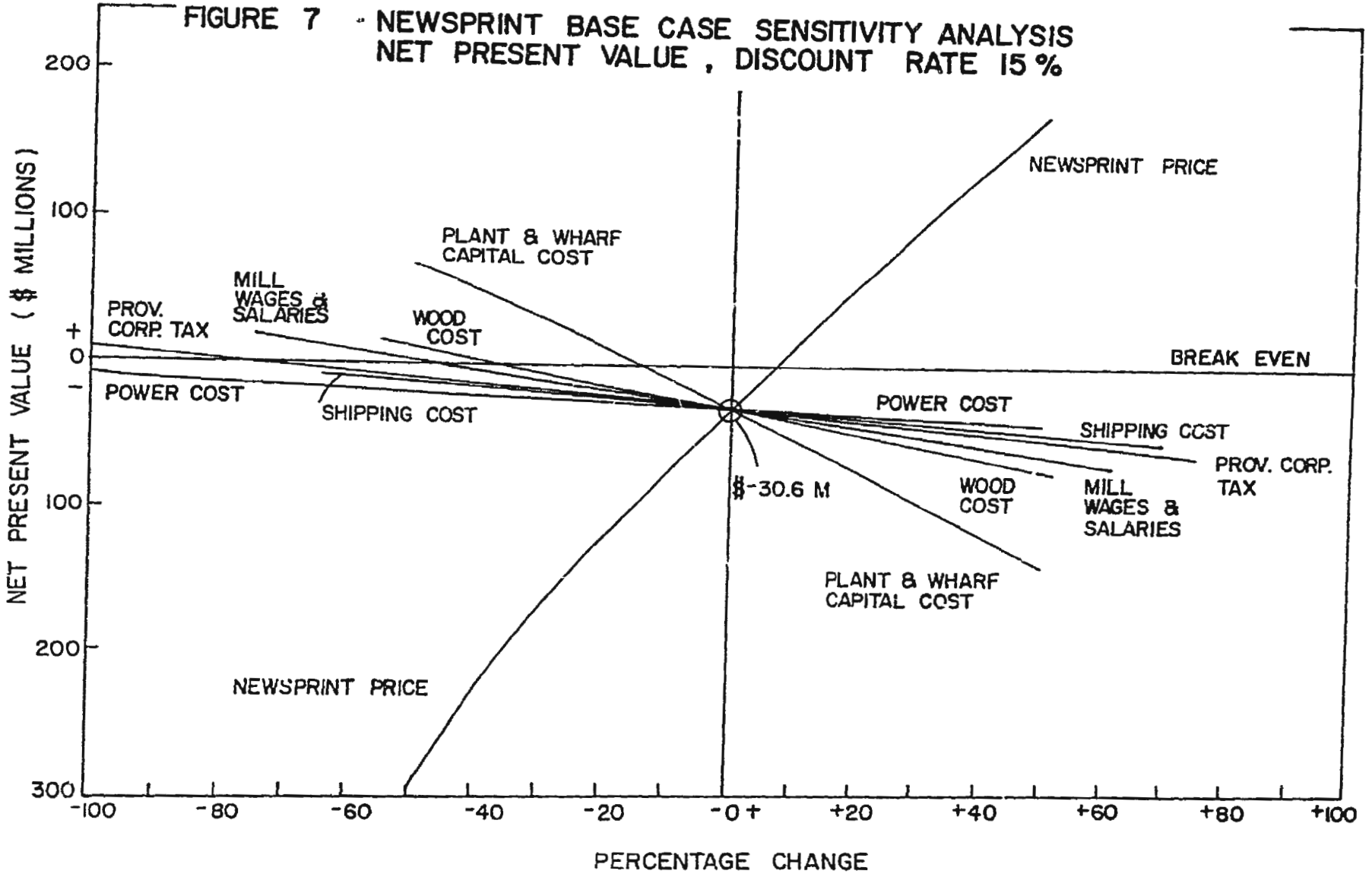


Table 21 - NEWSPRINT BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE ($ MILLIONS), DISCOUNT RATE 10%

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		237.7	215.5	200.1	175.5	150.6	125.4	100.2	74.9	49.1	23.4	-2.3
Wharf Capital Cost	153.3											
Roads & Bridges Capital Cost	137.8											
Wood Cost		203.6	188.1	172.4	156.7	141.1	125.4	109.7	94.1	78.4	62.6	46.6
Mill Wages & Salaries		186.8	174.5	162.2	149.9	137.7	125.4	113.1	100.8	88.6	76.3	64.0
Total Wages & Salaries		220.5	201.7	182.7	163.6	144.5	125.4	106.3	87.2	68.2	48.8	29.5
Power Cost (flat)	160.1	142.8	139.3	135.8	132.3	128.9	125.4	121.9	118.4	115.0	111.5	108.0
- inc. 6.7%/yr.	160.1		107.9		90.5		73.1		55.7		38.1	
Chemicals, Pkg. Mat., Oper. & Main. Supplies		146.3	142.1	137.9	133.7	129.6	125.4	121.2	117.0	112.9	108.7	104.5
Shipping Cost		155.8	149.7	143.6	137.5	131.5	125.4	119.3	113.2	107.2	101.1	95.0
Newsprint Price		-368.2	-232.4	-132.9	-44.5	41.2	125.4	208.9	291.5	365.7	445.3	524.9
Prov. Corp. Tax	213.2	169.3	160.5	151.7	142.9	134.2	125.4	116.6	107.8	99.0	90.3	81.5

FIGURE 8 -NEWSPRINT BASE CASE, COMPARISON OF NET PRESENT VALUE, DISCOUNT RATES 15% & 10%

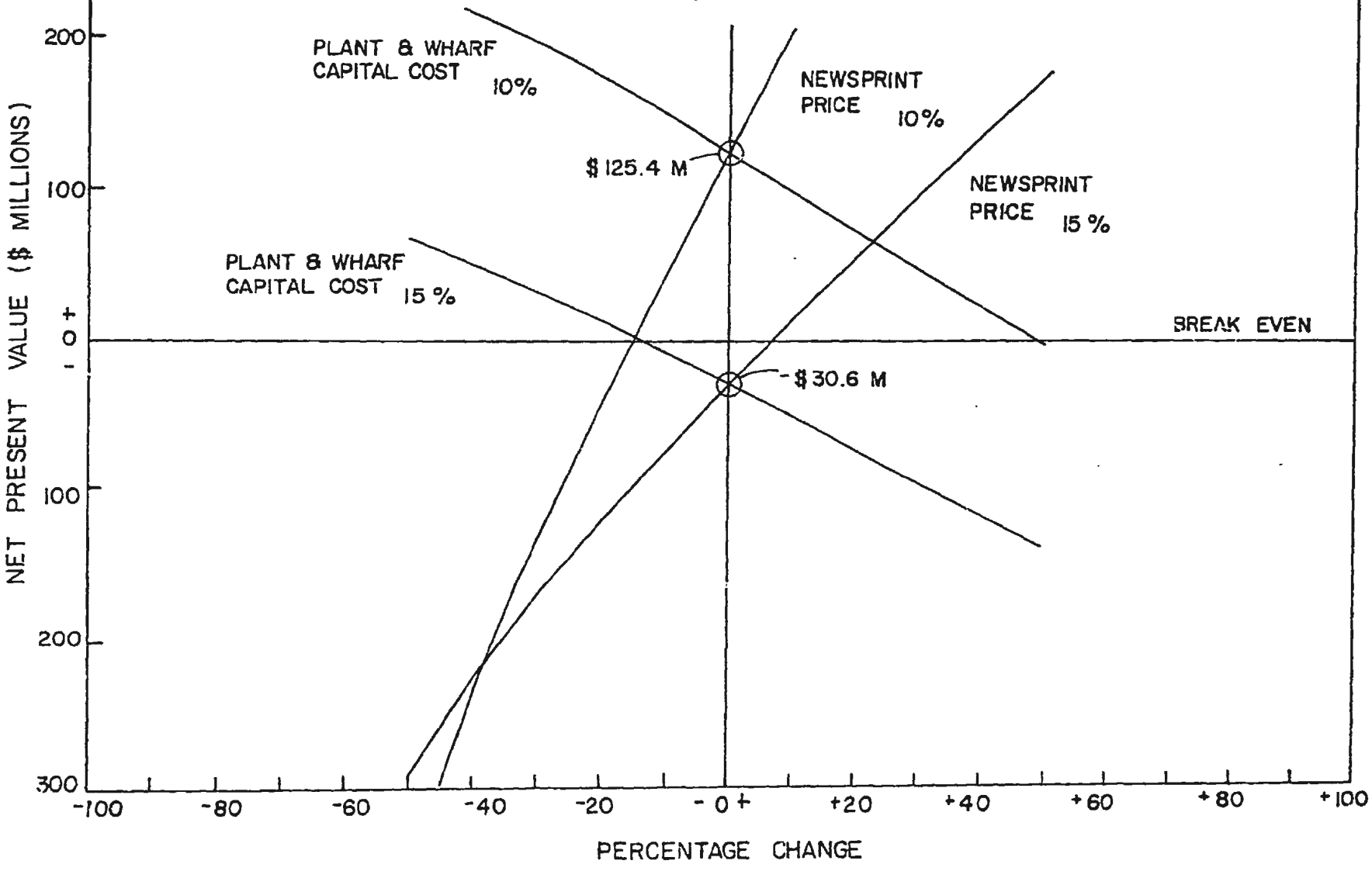


Table 22 - CIMP BASE CASE SENSITIVITY ANALYSIS, RATE OF RETURN (%)

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		15.7	14.3	13.3	12.2	11.3	10.5	9.8	9.1	8.6	8.0	7.6
Wharf Capital Cost	12.0											
Roads & Bridges Capital Cost	11.1											
Wood Cost		13.8	13.2	12.5	11.9	11.2	10.5	9.8	9.1	8.3	7.5	6.7
Mill Wages & Salaries		11.8	11.5	11.3	11.0	10.8	10.5	10.2	10.0	9.7	9.4	9.1
Total Wages & Salaries		13.2	12.7	12.1	11.6	11.1	10.5	9.9	9.3	8.7	8.1	7.4
Power Cost(flat)	12.1	11.3	11.1	11.0	10.8	10.7	10.5	10.3	10.2	10.0	9.9	9.7
- inc. 6.7%/yr.	12.1		9.7		8.8		7.9		6.9		5.9	
Chemicals		12.1	11.8	11.5	11.2	10.8	10.5	10.2	9.8	9.5	9.1	8.8
CIMP Price		Neg.	Neg.	0.6	4.7	7.9	10.5	12.8	14.9	16.6	18.3	20.0
Prov. Corp. Tax	12.1	11.3	11.2	11.0	10.8	10.7	10.5	10.3	10.1	10.0	9.8	9.6

FIGURE 9 - CTMP BASE CASE SENSITIVITY ANALYSIS, RATE OF RETURN

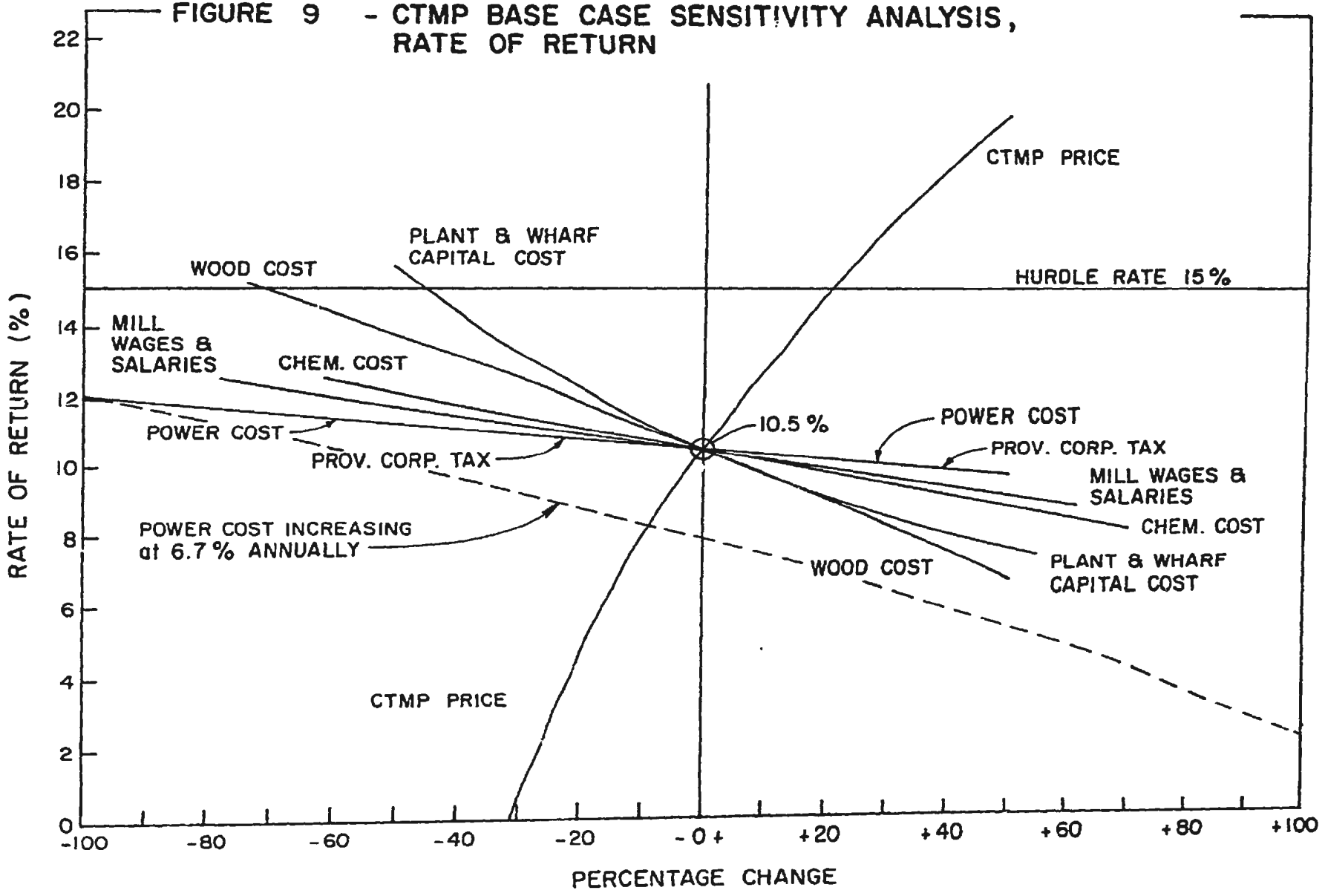


Table 23 - CIMP BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE ($ MILLIONS), DISCOUNT RATE 15%

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		5.9	-6.9	-17.5	-31.4	-45.3	-59.4	-73.6	-87.8	-102.2	-116.7	-131.1
Wharf Capital Cost	-34.6											
Roads & Bridges Capital Cost	-50.6											
Wood Cost		-16.7	-25.2	-33.7	-42.2	-50.7	-59.4	-68.1	-76.9	-85.9	-94.9	-104.0
Mill Wages & Salaries		-43.5	-46.7	-49.8	-53.0	-56.1	-59.4	-62.6	-65.8	-69.1	-72.3	-75.5
Total Wages & Salaries		-25.5	-32.2	-39.0	-45.7	-52.5	-59.4	-66.3	-73.3	-80.2	-87.3	-94.4
Power Cost(flat)	-38.1	-48.7	-50.8	-52.9	-55.0	-57.2	-59.4	-61.6	-63.8	-66.0	-68.1	-70.3
inc. 6.7%/yr.	-38.1		-66.5		-76.2		-85.9		-95.9		-106.0	
Chemicals		-39.3	-43.3	-47.3	-51.3	-55.3	-59.4	-63.5	-67.6	-71.7	-75.8	-80.0
CIMP Price		-256.8	-207.3	-159.2	-121.6	-89.6	-59.4	-30.2	-1.6	23.5	50.6	77.5
Prov. Corp. Tax	-41.9	-50.6	-52.4	-54.1	-55.9	-57.6	-59.4	-61.1	-62.9	-64.6	-66.4	-68.1

FIGURE 10 - CTMP BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE, DISCOUNT RATE 15 %

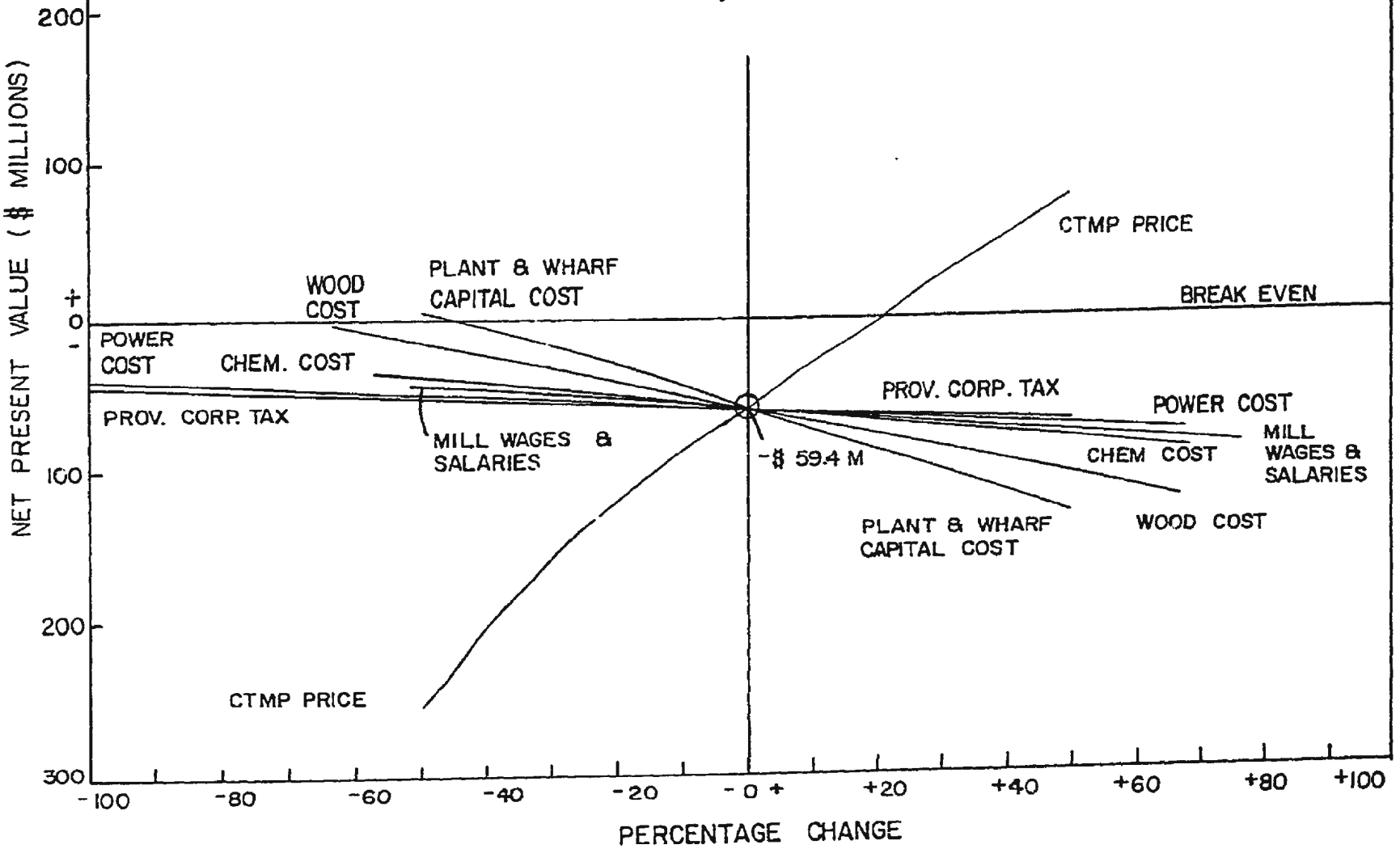
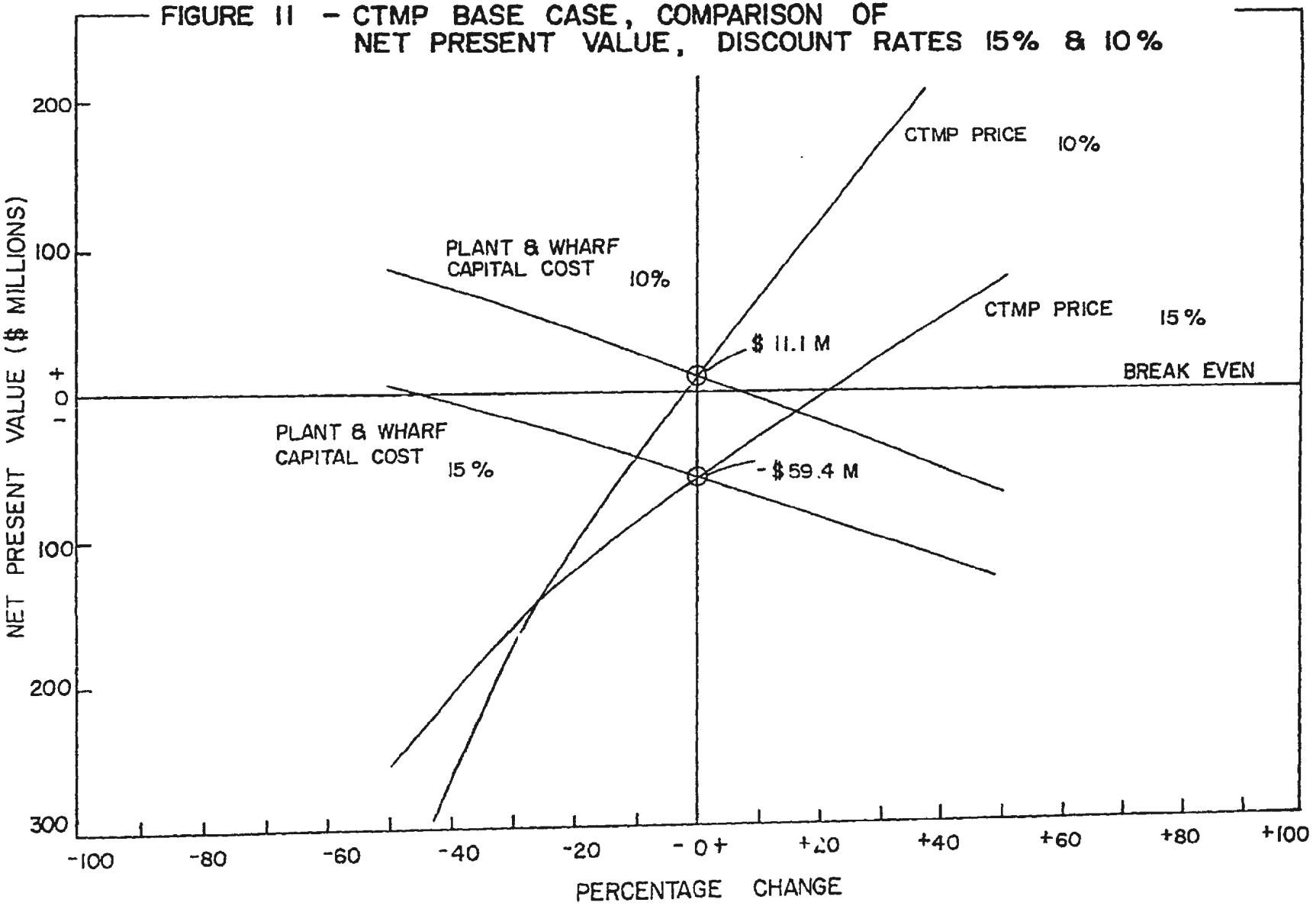


Table 24 - CIMP BASE CASE SENSITIVITY ANALYSIS
NET PRESENT VALUE ($ MILLIONS), DISCOUNT RATE 10%

VARIABLES	PERCENTAGE CHANGE											
	-100%	-50%	-40%	-30%	-20%	-10%	Base Case	+10%	+20%	+30%	+40%	+50%
Plant & Wharf Capital Cost		84.7	70.3	59.6	43.4	27.3	11.1	-5.3	-21.7	-38.3	-55.0	-71.7
Wharf Capital Cost	39.2											
Roads & Bridges Capital Cost	23.6											
Wood Cost		89.7	74.1	58.4	42.6	27.0	11.1	-4.9	-20.8	-37.0	-53.3	-69.6
Mill Wages & Salaries		41.1	35.1	29.1	23.2	17.2	11.1	5.1	-1.0	-7.1	-13.1	-19.2
Total Wages & Salaries		75.1	62.4	49.6	36.8	24.0	11.1	-1.9	-14.8	-27.8	-41.0	-54.1
Power Cost(flat)	46.5	28.9	25.4	21.8	18.3	14.8	11.1	7.5	3.9	0.3	-3.3	-7.0
-inc. 6.7%/yr.	46.5		-6.6		-24.6		-42.6		-60.9		-79.2	
Chemicals		48.2	40.8	33.4	26.0	18.7	11.1	3.6	-3.9	-11.4	-19.0	-26.5
CIMP Price		-361.3	-263.6	-170.6	-103.6	-45.2	11.1	66.3	121.0	169.9	222.3	274.5
Prov. Corp. Tax	51.2	31.2	27.2	23.2	19.1	15.1	11.1	7.1	3.1	-0.9	-4.9	-8.9

FIGURE 11 - CTMP BASE CASE, COMPARISON OF NET PRESENT VALUE, DISCOUNT RATES 15% & 10%



Both the ROR and NPV of the newsprint base case exhibit the greatest sensitivity to changes in newsprint price - as indicated by the steepness of the slope of its graph - followed by the major cost components in the following order:

1. newsprint price
2. plant and wharf capital cost
3. wood cost
4. mill wages and salaries
5. Provincial corporate tax
6. shipping cost
7. chemicals, packaging materials, operating and maintenance supplies costs
8. power cost

The cost and price components in the CTMP base case rank similarly as follows:

1. CTMP price
2. plant and wharf capital cost
3. wood cost

4. chemicals cost
5. mill wages and salaries
6. power cost
7. Provincial corporate tax

Note that plant and wharf capital cost has a greater effect than wood cost on the attractiveness of this investment for negative changes, while the opposite is true for positive changes. Chemicals cost is broken out separately in this case because of its greater importance. On the other hand, shipping cost is not a factor as CTMP prices are quoted in FOB mill terms and it is assumed that shipping costs are fully recoverable from customers or are their responsibility. While the effect of power cost on the NPV of this investment is slightly greater than that of Provincial corporate tax, the two are virtually indistinguishable in their effect on the ROR.

The effect of variations in product price on the attractiveness of both these investments approaches or even exceeds that of all the cost components combined, which is what one would anticipate, since the price per unit must cover the total cost per unit in order to generate positive cash flows and profits.

As previously explained, it was assumed in the newsprint base case that newsprint prices would recover to where they would have been had the 1981 price of U.S. $500/tonne not dropped but had kept up with inflation. If, however, this proves unduely optimistic and present short term forecasts, which are about 10% below this, are more indicative of long term trends, the ROR would be about 11.2% or 2.3 percentage points below that of the base case. This would mean that the ROR would be about 3.8 percentage points short of the hurdle rate rather than 1.5 percentage points. The prospect for newsprint price levels above those assumed is poor.

While similar logic was used to develop CTMP price forecasts, the prospect of these levels being achieved or even exceeded is considered good if, as expected, CTMP continues to move into lower grade kraft pulp markets. In that event, its price is expected to approach that of bleached hardwood kraft pulp which would be between 20% and 50% above that assumed in the base case. This would push the ROR of this investment to between 14.9% and 20%, making it a very attractive investment.

Discussions with Sandwell Management Consultants subsequent to their 1979 study indicated that the degree of accuracy associated with their estimates of plant capital cost - from which the estimates for this analysis were

developed - was about ±25%. A recent consideration of the capital cost of constructing a wharf at North West Point specifically to serve the needs of a pulp or paper operation indicated that this might be built for as little as $18 million exclusive of warehouse and loading facilities. This suggests a similar range of accuracy in the capital cost estimate for this item. If plant and wharf capital requirements for a newsprint mill are 25% less than that assumed, the ROR on this investment would be about 16.5% or 2.8 percentage points above the base case results and in excess of the hurdle rate. If they are 25% greater, the ROR would be about 11.5% or only 2.0 percentage points below that of the base case. For a CTMP mill, a -25% difference in plant and wharf capital cost would improve the ROR on this investment by about 2.2 percentage points to 12.7% - still well short of the hurdle rate - while a +25% difference would result in a ROR of only about 8.8%, i.e. 1.7 percentage points below that of the base case. The potential of this cost component to signficantly affect the attractiveness of these investments recommends itself as an area requiring further refinement.

Three components of these capital costs might not be incurred elsewhere and, therefore, could be considered penalties associated with this location:

1. The cost of constructing a wharf at North West Point.
2. A 10% higher cost of construction for Labrador implicit in the estimates.
3. Provincial sales tax of 12% on manufacturing equipment.

The cost of constructing a wharf at North West Point amounts to about a 1.2 percentage point penalty in ROR for an investment in newsprint and about a 1.5 percentage point penalty in ROR for an investment in CTMP. The ROR of these investments would otherwise be 14.7% and 12.0% respectively. The 10% construction cost differential associated with Labrador reduces the ROR for an investment in newsprint by about 1.0 percentage point, and that for an investment in CTMP by about 0.8 of a percentage point. Provincial sales tax on manufacturing equipment would amount to about $15.3 million for a newsprint mill and $8.2 million for a CTMP mill. This is about 5% of the total capital cost of plant and wharf for a newsprint mill and results in about 0.5 of a percentage point penalty in ROR on this investment. It is about 4% of the total capital cost of plant that wharf for a CTMP mill and results in a penalty of about 0.4 of a percentage point in ROR for this investment. In each case, the ROR is penalized by a total of 2.7 percentage points because of these components

indicating that it would otherwise be 16.2% for newsprint or 1.2 percentage points above the hurdle rate, while for CTMP, it would otherwise be 13.2%

It is not surprising that grants applicable to capital costs are one of the most popular forms of Government financial incentives for new industry development. The Federal Government through the Department of Regional Industrial Expansion (DRIE) is the main source of such funds. Eligible projects in the Goose Bay area of Labrador could receive grants up to 50% of their capital cost under their Industrial Regional Development Program (IRDP). If plant and wharf capital requirements were to receive the maximum level of grant available, it would have the effect of increasing the ROR for investment in newsprint to about 20.4% - making it very attractive - and that for investment in CTMP to about 15.7%. Only a 15% grant is necessary to breach the hurdle rate in the case of newsprint, however, a 46% grant is necessary to achieve this in the case of CTMP.

IRDP is a new program, however, and there has been no precedent to date to indicate that a pulp or paper project would qualify for funding. In fact, an industry task force established by the Federal Government to advise it on problems and policy in this sector has recently

recommended that Government move away from grants in favour of tax relief as its chief means of providing financial incentives to such industry. This would supposedly strengthen the pulp and paper industry in Canada by discouraging new operations from starting-up which would otherwise not be viable and make more money available to profitable operations for re-investment.

It is also conceivable that the Federal Government could assist by providing a public wharf at North West Point - as it has in other places - serving a number of local needs including those of a newsprint or CTMP mill. As previously indicated, this would improve the ROR of a newsprint investment by about 1.2 percentage points to 14.7% and that of a CTMP investment by about 1.5 percentage points to 12.0%. Another possibility would be for the Federal Government to construct a dedicated wharf for a newsprint or CTMP mill and lease it on a buy back basis similar to the arrangement made for the wharf at the Come by Chance oil refinery. This would change the time distribution of cash flows for this item and improve the ROR in each case by something less than if this was not a cost to these projects.

The capital cost of major roads and bridges required for harvesting operations in FMU 19 could also be consid-

ered a cost penalty associated with this location as such infrastructure may be in place elsewhere. The Province through the Department of Forest Resources and Lands has recognized this fact in certain areas on the island of Newfoundland and has provided such capital roads and bridges in support of local forest industries. The negative impact of this item on the ROR of newsprint and, consequently, the benefit which stands to be gained by applying this policy to the situation in FMU 19, however, is only 0.4 of a percentage point, i.e. the ROR on an investment in newsprint exclusive of the capital cost of major roads and bridges is 13.9%. For an investment in CTMP, this difference would be about 0.6 of a percentage point making the ROR about 11.1%. Applying the same amount of funds against plant and wharf capital requirements would have an equivalent effect on ROR in each case.

The experience of Labrador Linerboard Limited suggests another means of reducing wood cost or at least keeping it under control would be to contract private companies to harvest wood. The competition between these contracting companies would ensure that inefficiencies and overhead costs are kept to a minimum.

As previously indicated, all wages and salaries in the base cases include a 10% northern allowance benefit

which is thought to be necessary to attract and keep a trained and experienced management and labour force in the Goose Bay area. This penalizes the ROR of the newsprint base case by about 0.5 of a percentage point and that of the CTMP base case by about 0.6 of a percentage point, i.e. the ROR would otherwise be about 14.0% and 11.1% respectively. Mill wages and salaries account for 0.3 of a percentage point in the case of newsprint from which it is deduced that woodlands wages and salaries account for the remaining 0.2 of a percentage point. For CTMP, the difference in ROR is evenly attributable to these two components, i.e. 0.3 of a percentage point each. This factor could, however, mitigate with time as employees become more settled and this incentive to stay becomes unnecessary.

Provincial corporate tax is one of only two means at the Province's disposal with which it can lever the attractiveness of these investments and for which it incurs no direct, out of pocket expenses. The other is Provincial sales tax which was discussed previously. This is an important consideration because the Province's limited fiscal capacity precludes any extensive use of grants as a form of financial incentive to these investments. In the extreme case that Provincial corporate tax is eliminated, the ROR for newsprint would be just above

the hurdle rate at about 15.4% while that for CTMP would be about 12.1%. There is, however, an opportunity cost to Government associated with these items. This should be taken into account as part of a cost/benefit analysis to determine the extent to which Government financial participation is justified.

Variations in the cost of shipping newsprint turn out to have relatively little impact on the ROR of this investment. The main reason for this is that shipping cost increases at about one-half to two-thirds the average rate assumed for other costs and prices due to its capital component being constant. This is a benefit of having a ship dedicated to serving this operation. If markets dictated that shipping arrangements be made on the open market and suitable vessels were available, this cost could be expected to be much greater over time and have a bigger impact on the ROR of this investment.

While no sensitivity analysis was performed on the cost of trucking product between Muskrat Falls and North West Point and handling, this cost was developed similar to shipping cost in that it, too, increases at a lesser rate than other costs and prices. As its initial value was less than 20% of that for shipping cost, it can be in-

ferred that this component has an even smaller effect on ROR.

No increase in power price over time was assumed in either case for reasons stated previously. The benefit of constant power rates is illustrated in Figures 6 and 9. The broken line reflects the sensitivity of ROR to changes in the price of power subject to the average rate of increase in all cost and prices, i.e. 6.7% annually. Using the initial price in the base case, the ROR for a newsprint investment would be about 12.2% or about 1.3 percentage points less than if the power rate is flat. For a CTMP investment, this difference in ROR is about 2.6 percentage points, i.e. its ROR using the initial base case power price and increasing it at 6.7% annually would only be about 7.9%.

One possibility identified for reducing power rates is to upgrade the existing 138 kV transmission line to 230 kV which would at least double its capacity and enable it to meet the additional demand for a newsprint or CTMP mill. While the technical feasibility of this has not been confirmed, it offers the potential for dramatically reducing capital costs in comparison with constructing a new 230 kV line and could result in power rates as much as 40% below those assumed in the base cases. This would

improve the ROR for newsprint by only about 0.4 of a percentage point to 13.9% - assuming that these rates remain constant. The effect would be somewhat greater if power rates increased in line with other costs and prices.

Even if all possible measures were taken to reduce costs to a minimum and subsidies were provided such that there was no charge for power, the ROR for a newsprint investment could only be improved a maximum of 1.0 percentage point to 14.5% - not enough to push it over the hurdle rate. For a CTMP investment, the improvement would amount to 1.6 percentage points making the ROR 12.1% - still far short of the hurdle rate.

Figures 8 and 11 shows the effect of a lower discount rate (10%) on the NPV for each of these investments using the two major cost and price components - product price and plant and wharf capital cost. This indicates how the attractiveness of the investment would change should economic expectations decline. In each case, there is a significant improvement in NPV and, at this particular discount rate, both investments exceed the break even mark. There are, however, two points worth noting:

1. Newsprint, which was about twice as attractive as CTMP at a 15% discount rate, is over eleven

times as attractive at a 10% discount rate. Thus, the preferred investment becomes even better.

2. The NPV's of these investments exhibit greater sensitivity to cost and price components at lower discount rates.

Figure 12 which is derived from data in Table 25 compares the sensitivity of the ROR for these two investments to variations in the rates by which cost and prices in the models are increased. While the hurdle rate is shown as 15%, this is to a degree a function of the inflation rate and could be expected to move up or down with these changes. It is apparent from these graphs that the preferred investment - newsprint - increases in attractiveness over CTMP with increases in these rates, similar to the effect of lowering discount rates on NPV. The points at the extreme left of these graphs correspond to the results which would be obtained if the analysis had been carried out in constant 1983 dollars with no consideration given to real changes in costs and prices. The ROR for newsprint would be 3.8% and that for CTMP would be 3.4%. For the reasons outlined previously, however, these cannot be considered the real, constant dollar rates for return for these investments.

Other factors in the analysis besides costs and prices which could have an effect on the attractiveness of these investments were examined as well.

Table 26 shows the sensitivity of the newsprint and CTMP base cases to an increase of 40,000 cubic meters or about 11% in the AAC of FMU 19 to 400,000 cubic meters. In the case of a newsprint mill, such an increase would allow the efficiencies of modern paper machine technology to be fully realized and would result in an increase in the ROR for this investment of about 1.7 percentage points to 15.2% - in excess of the hurdle rate. This assumes, however, that the capital cost of facilities would be the same at both levels of production which may not be accurate and may dilute the indicated benefit somewhat. The difference in the ROR because of this shortfall in AAC necessary for full efficiencies can be considered a penalty associated with this location. The indicated improvement in the ROR for a CTMP investment if this additional AAC was available is about 1.5 percentage points raising the ROR to 12.0%. This may not be realistic, however, as the efficiencies of CTMP production are not as dependent on size.

Table 25 - NEWSPRINT AND CTMP BASE CASES

SENSITIVITY TO COMBINED INFLATION AND ESCALATION RATES

	PERCENTAGE CHANGE										
	-100%	-80%	-60%	-40%	-20%	Base	+20%	+40%	+60%	+80%	+100%
		-90%	-70%	-50%	-30%	-10% Case	+10%	+30%	+50%	+70%	+90%
NEWSPRINT											
R.O.R. (%)	3.8	6.3	8.4	10.3	12.0	13.5	15.0	16.5	17.9	19.2	20.5
		5.1	7.4	9.4	11.1	12.8	14.3	15.8	17.2	18.5	19.8
N.P.V. ($ Millions), Discount Rate 15%	-110.4	-101.3	-89.6	-74.4	-55.2	-30.6	0.6	40.0	89.3	150.8	227.4
		-106.2	-95.9	-82.5	-65.4	-43.6	-15.9	19.1	63.3	118.3	187.0
N.P.V. ($ Millions), Discount Rate 10%	-93.4	-67.6	-35.0	6.7	59.0	125.4	209.3	315.1	448.3	615.3	825.0
		-81.2	-52.3	-15.4	31.3	90.3	164.9	259.1	377.9	527.1	714.2
CTMP											
R.O.R. (%)	3.4	5.0	6.5	7.9	9.2	10.5	11.8	13.0	14.1	15.3	16.4
		4.2	5.7	7.2	8.5	9.9	11.1	12.4	13.6	14.7	15.9
N.P.V. ($ Millions), Discount Rate 15%	-82.5	-80.7	-77.7	-73.5	-67.5	-59.4	-48.6	-34.7	-16.7	6.2	35.3
		-81.7	-79.4	-75.7	-70.7	-63.7	-54.3	-42.1	-26.3	-5.9	19.9
N.P.V. ($ Millions), Discount Rate 10%	-73.4	-64.3	-52.1	-36.2	-15.5	11.1	45.2	88.5	143.3	212.5	299.3
		-69.2	-58.6	-44.6	-26.5	-3.1	27.2	65.5	114.3	175.9	253.5

FIGURE 12 - NEWSPRINT & CTMP BASE CASES, RATE OF RETURN SENSITIVITY TO COMBINED INFLATION & ESCALATION RATES

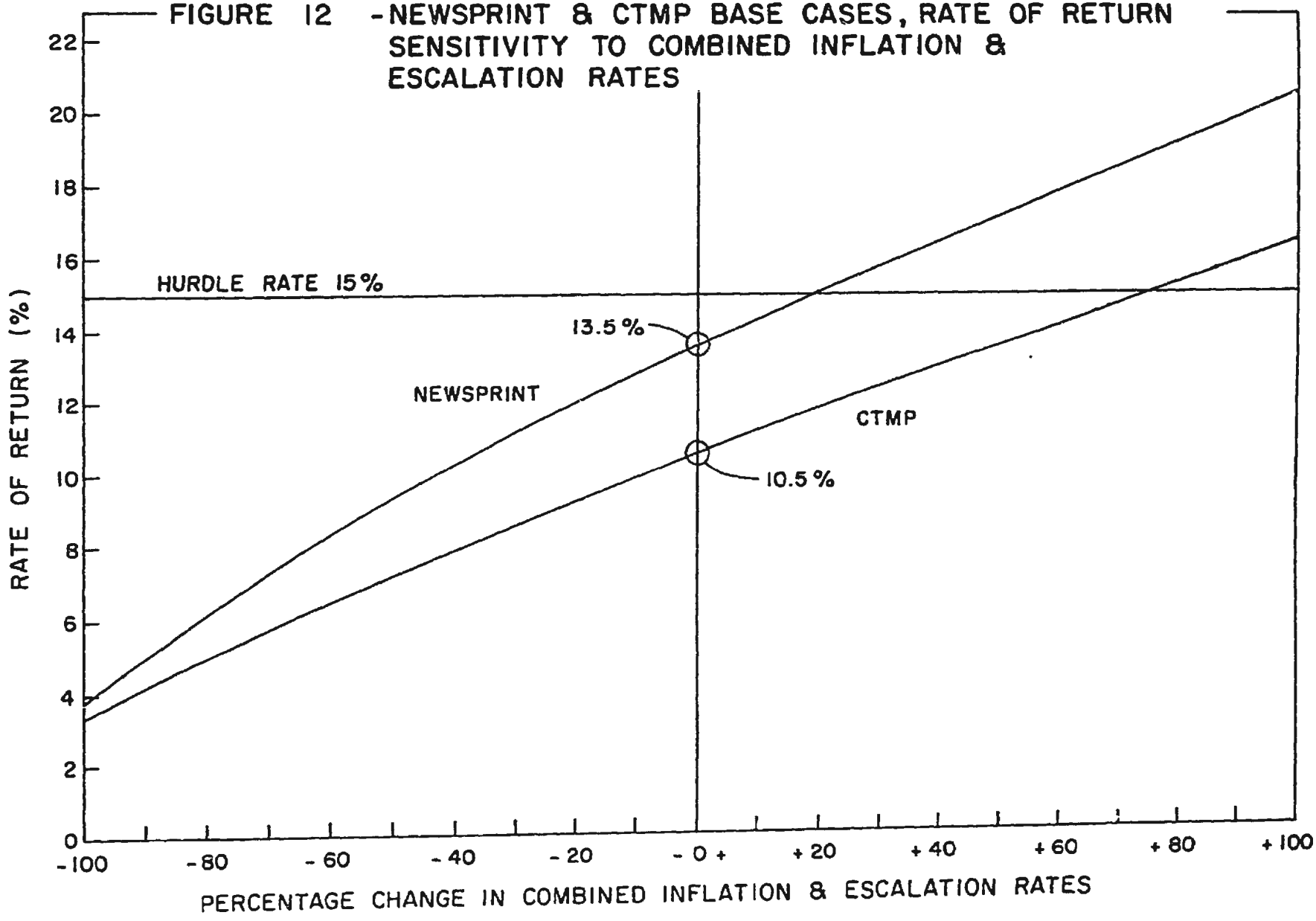


Table 26 - NEWPRINT AND CTMP BASE CASES

SENSITIVITY TO ANNUAL ALLOWABLE CUT (AAC)

	ANNUAL ALLOWABLE CUT (AAC)	
	BASE CASE $360,000m^3$	$400,000m^3$
NEWSPRINT		
R.O.R. (%)	13.5	15.2
N.P.V. ($ Millions), Discount Rate 15%	-30.6	3.4
N.P.V. ($ Millions), Discount Rate 10%	125.4	191.1
CTMP		
R.O.R. (%)	10.5	12.0
N.P.V. ($ Millions), Discount Rate 15%	-59.4	-41.0
N.P.V. ($ Millions), Discount Rate 10%	11.1	46.9

Table 27 indicates what would happen to the attractiveness of a newsprint investment if, contrary to expectations, some proportion of supplementary semi-bleached kraft pulp is required to improve sheet strength. Conversely, it may be considered as the benefit attributable to this location owing to the high quality of the wood resource. Thus, more southerly locations which must utilize faster growing but poorer quality species such as pine could be penalized by as much as 1.0 percentage point on the ROR for such an investment because of this requirement.

The benefit associated with the 10% reduction in bleaching chemicals for CTMP believed possible because of the inherent brightness of Labrador wood amounts to about 0.3 of a percentage point in ROR as indicated in Table 22.

As previously discussed, it was assumed in the models that installed capacity would be about 5% greater than that which could be sustained by the resource so that the normal operating rate based on the AAC would be 95%. The potential effect of lower operating rates on the attractiveness of these investments is shown in Table 28. A 75% operating rate in each case would result in a correspond-

Table 27 - NEWPRINT BASE CASE

SENSITIVITY TO REQUIREMENT FOR

SUPPLEMENTARY SEMI-BLEACHED KRAFT PULP

	SEMI-BLEACHED KRAFT PULP CONTENT AS PERCENTAGE OF TOTAL OVEN DRY (OD) FIBRE			
	BASE CASE 0%	5%	10%	15%
R.O.R. (%)	13.5	13.2	12.9	12.5
N.P.V. ($ Millions), Discount Rate 15%	-30.6	-37.1	-44.3	-52.4
N.P.V. ($ Millions), Discount Rate 10%	125.4	114.4	102.2	88.5

ing decline of 2.9 percentage points in the ROR for each of these investments. The sensitivity to this item is second only to that for product price. Moreover, the decline in ROR for a given percentage change in operating rate is not constant but rather increases with lower operating rates. Of course oprating rates will fluctuate over the life of the project but the degree will depend on the specific market situation of a newsprint or CTMP mill and its competitiveness in terms of product quality and costs. The 95% operating rate assumed is optimistic by normal standards and perhaps could only be achieved under captive market conditions. Under open market conditions, operating rates could be expected to average about 90% resulting in lower rates of return, i.e. 12.9% for newsprint and 9.8% for CTMP.

The short shipping season for conventional vessels in and out of Goose Bay has long been considered a major constraint to industrial development in the area partly because of the increased working capital requirements for larger inventories. While it is felt that dedicated ice breaking cargo vessels would be able to ship on a year round basis thus avoiding this problem, the effect on the ROR for these investments of possibly having to carry increased inventory levels due to restrictions in the

Table 28 - NEWSPRINT AND CTMP BASE CASES

SENSITIVITY TO OPERATING RATE

	OPERATING RATE				
	BASE CASE 95%	90%	85%	80%	75%
NEWSPRINT					
R.O.R. (%)	13.5	12.9	12.2	11.4	10.6
N.P.V. ($ Millions), Discount Rate 15%	-30.6	-44.0	-57.4	-71.1	-84.9
N.P.V. ($ Millions), Discount Rate 10%	125.4	99.4	73.4	47.1	20.7
CTMP					
R.O.R. (%)	10.5	9.8	9.1	8.4	7.6
N.P.V. ($ Millions), Discount Rate 15%	-59.4	-67.2	-75.0	-83.0	-91.1
N.P.V. ($ Millions), Discount Rate 10%	11.1	-4.0	-19.1	-34.4	-49.8

shipping season was examined. The results are presented in Table 29. Note that the inventory levels are averages for a year. These average inventory levels include outgoing product and incoming supplies and as explained previously are calculated to correspond with variations in the shipping season as follows:

Average Inventory Level	Shipping Season
45 days	10 months
60 days	9 months
75 days	8 months
90 days	7 months
105 days	6 months

It turns out that the level of these inventories has a surprisingly small effect on the attractiveness of these investments. Even if the shipping season could not be extended beyond the present six months, the penalty would only be about 0.3 of a percentage point in the ROR for newsprint and 0.5 of a percentage point in that for CTMP. Nevertheless, such delays in getting product to market could cause serious quality deterioration of CTMP (through brightness reversion and resin migration to fibre surfaces

Table 29 - NEWSPRINT AND CTMP BASE CASES

SENSITIVITY TO SHIPPING INVENTORY LEVELS

	AVERAGE INVENTORY LEVEL				
	BASE CASE 45 Days	60 Days	75 Days	90 Days	105 Days
NEWSPRINT					
R.O.R. (%)	13.5	13.4	13.4	13.3	13.2
N.P.V. ($ Millions), Discount Rate 15%	-30.6	-32.4	-34.3	-36.1	-37.9
N.P.V. ($ Millions), Discount Rate 10%	125.4	123.1	120.7	118.4	116.0
CTMP					
R.O.R. (%)	10.5	10.4	10.3	10.2	10.0
N.P.V. ($ Millions), Discount Rate 15%	-59.4	-61.4	-63.4	-65.4	-67.4
N.P.V. ($ Millions), Discount Rate 10%	11.1	8.6	6.0	3.5	0.9

which hampers repulping) and could interfere with the marketing of these products to the point where product prices and operating rates are affected.

Table 30 illustrates the favourable effect on these investments attributable to the devalued Canadian dollar relative to the U.S. dollar. This amounts to about 4.6 percentage points on the ROR for a newsprint investment and about 5.4 percentage points on that for a CTMP investment. The importance of this item on the attractiveness of these investments is roughly on a par with product price, which is what one would expect, since both directly effect revenues in the same manner. This item can be considered as an advantage associated with locating in Canada rather than some other country and is not a factor between Goose Bay and other locations in Canada.

The potential for debt financing to improve the attractiveness of these investments is shown in Figures 13 and 14 based on data in Tables 31 and 32. Here, ROR refers to rate of return on the investor's equity rather than on the investment as a whole. It is apparent from these that debt financing can be used by an investor to

Table 30 - NEWSPRINT AND CTMP BASE CASES

SENSITIVITY TO CURRENCY EXCHANGE RATE

	$ CANADIAN IN $ U.S.				
	BASE CASE 0.81	0.85	0.90	0.95	PAR
NEWSPRINT					
R.O.R. (%)	13.5	12.5	11.2	10.0	8.9
N.P.V. ($ Millions), Discount Rate 15%	-30.6	-51.3	-75.1	-96.6	-116.4
N.P.V. ($ Millions), Discount Rate 10%	125.4	86.0	41.2	0.9	-35.9
CTMP					
R.O.R. (%)	10.5	9.3	7.9	6.5	5.1
N.P.V. ($ Millions), Discount Rate 15%	-59.4	-73.4	-89.6	-104.3	-97.5
N.P.V. ($ Millions), Discount Rate 10%	11.1	-15.2	-45.2	-72.3	-118.7

Table 31 - NEWSPRINT BASE CASE SENSITIVITY TO DEBT FINANCING

	INTEREST RATE										
	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%
50% DEBT FINANCING:											
R.O.R. (on equity; %)[1]	19.2	18.8	18.5	18.1	17.8	17.4	17.0	16.5	16.1	15.6	15.1
N.P.V. ($ Millions), Discount Rate 15%	49.2	45.6	41.6	37.4	33.0	28.4	23.5	18.2	12.7	7.0	0.9
N.P.V. ($ Millions), Discount Rate 10%	193.5	187.2	180.4	173.3	165.8	157.9	149.5	140.6	131.3	121.7	111.6
30% DEBT FINANCING:											
R.O.R. (on equity; %)[2]	16.1	16.0	15.8	15.7	15.5	15.3	15.1	14.9	14.7	14.5	14.3
N.P.V. ($ Millions), Discount Rate 15%	17.2	15.1	12.9	10.4	7.8	5.0	2.1	-0.9	-4.1	-7.4	-10.8
N.P.V. ($ Millions), Discount Rate 10%	166.1	162.5	158.6	154.4	149.9	145.1	140.2	135.0	129.6	124.0	118.2

1. Interest rates up to 16.1% could be incurred before this level of debt financing yielded a rate of return less than the hurdle rate (15%). Similarly, interest rates can go as high as 19.0% before the rate of return becomes worse than for 100% equity financing (13.5%).

2. The rate of return at this lower level of financing is much more sensitive to interest rates - in order to stay above the hurdle rate, interest rates cannot go above 12.7%. Interest rates up to 19.4% can be incurred before it no longer makes sense to debt finance.

FIGURE 13 - NEWSPRINT BASE CASE , RATE OF RETURN SENSITIVITY TO DEBT FINANCING

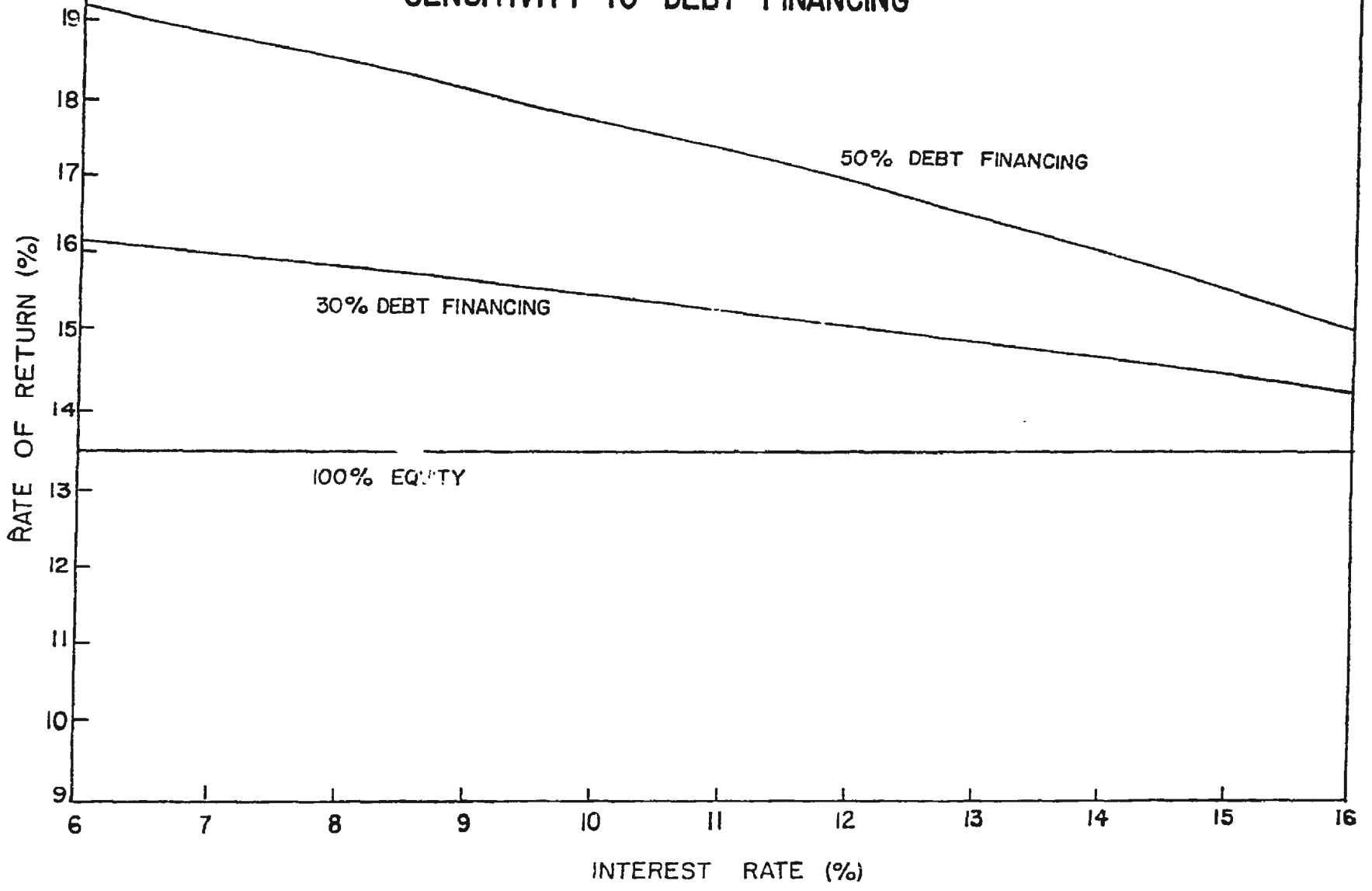


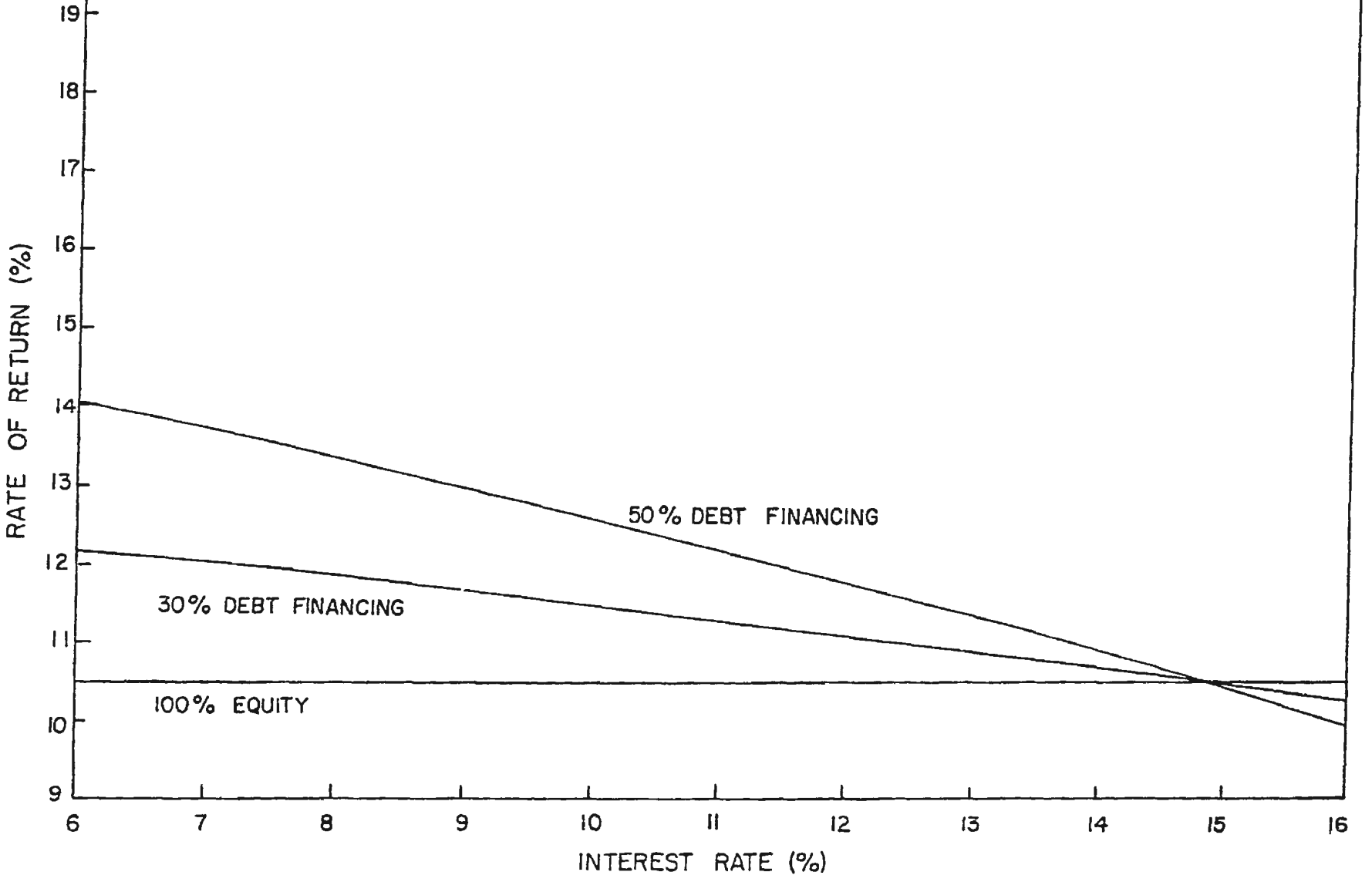
Table 32 - CIMP BASE CASE SENSITIVITY TO DEBT FINANCING

	INTEREST RATE										
	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%
50% DEBT FINANCING:											
R.O.R. (on equity; %)[1]	14.1	13.7	13.4	13.0	12.6	12.2	11.8	11.4	10.9	10.4	9.9
N.P.V. ($ Millions), Discount Rate 15%	-7.2	-9.8	-12.6	-15.5	-18.6	-21.9	-25.3	-29.1	-33.0	-37.2	-41.7
N.P.V. ($ Millions), Discount Rate 10%	55.5	51.1	46.5	41.6	36.4	30.9	25.3	19.1	12.6	5.8	-1.5
30% DEBT FINANCING:											
R.O.R. (on equity; %)[2]	12.2	12.0	11.9	11.7	11.5	11.3	11.1	10.9	10.7	10.5	10.3
N.P.V. ($ Millions), Discount Rate 15%	-28.2	-29.7	-31.2	-33.0	-34.8	-36.7	-38.7	-40.8	-43.0	-45.3	-47.8
N.P.V. ($ Millions), Discount Rate 10%	37.6	35.1	32.4	29.5	26.5	23.2	19.9	16.4	12.7	8.8	4.8

1. It is virtually impossible to achieve the hurdle rate (15%) at this level of debt financing as interest rates would have to be less than 2.7%. Interest rates can go as high as 14.8% before the rate of return becomes worse than for 100% equity financing (10.5%).

2. The hurdle rate cannot be achieved at this level of debt financing. The rate of return exceeds that for 100% equity financing, however, while interest rates are below 15.0%.

FIGURE 14 - CTMP BASE CASE, RATE OF RETURN SENSITIVITY TO DEBT FINANCING



lever his investment and increase his ROR for interest rates up to about 19% for newsprint and about 15% for CTMP. At present interest rates of about 11%, 30% debt financing would improve the ROR on newsprint by about 1.8 percentage points to 15.3% and that on CTMP by about 0.8 percentage points to 11.3%. At 50% debt financing, this improvement would amount to 3.9 percentage points for newsprint and 1.7 percentage points for CTMP. Under these conditions, therefore, an investor should take on as much debt as his credit and ability to repay will allow. It is unlikely, however, that financers would permit an investor to lever these investments more than 50% so that he shares at least equally in any risk involved. Government may be able to positively affect the attractiveness of these investments by extending loan guarantees to an investor to ensure that his leverage is maximized. This form of financial participation is desirable because Government does not incur any direct, out of pocket expenses and, unlike reduction in Provincial sales tax or Provincial corporate tax, there is no opportunity cost associated with it.

9. CONCLUSIONS

1. None of the product options examined for a forest industry development in Labrador can be considered attractive investments unless positive changes can be made in base case inputs and assumptions and/or forms of Government financial incentives are provided.

2. An integrated newsprint and lumber or CTMP and lumber operation for Forest Management Unit 19 is a less attractive investment than a newsprint or CTMP operation alone. This is mainly because the timber resource is inadequate to enable full utilization of sawlog material for lumber and, at the same time, enable a newsprint mill or CTMP mill to achieve the economies of scale available to each. This is somewhat aggrevated by implicitly higher capital costs for Labrador. Profits from lumber sales do not compensate for the loss in profits from newsprint or CTMP sales.

   If a sawmill is first developed in FMU 19, it could, therefore, jeopardize the possibility of attracting development of a newsprint or CTMP mill later.

3. The newsprint option is the most attractive investment of those considered under base case inputs and assumptions. With a ROR of 13.5%, however, it is still 1.5 percentage points below the hurdle rate of 15%. The quantifiable penalties and benefits associated with locating a newsprint mill in Labrador in terms of ROR are as follows:

Penalties (percentage points):	
- plant and wharf capital cost	2.7
- roads and bridges capital cost	0.4
- wages and salaries	0.5
- limited wood resource capacity	1.7
Total:	5.3

Benefits (percentage points):	
- flat power rates	1.3
- wood quality	1.0
Total:	2.3

There is, therefore, an identifiable net penalty of 3.0 percentage points, i.e. a newsprint mill investment elsewhere could expect a ROR of 16.5%.

4. The CTMP option with a ROR of 10.5% under base case inputs and assumptions is the second most attractive

investment. The quantifiable penalties and benefits associated with locating a CTMP mill in Labrador in terms of ROR are as follows:

Penalties (percentage points):	
- plant and wharf capital cost	2.7
- roads and bridges capital cost	0.6
- wages and salaries	0.6
- limited wood resource capacity	1.5
Total:	5.4
Benefits (percentage points):	
- flat power rates	2.6
- wood quality	0.3
Total:	2.9

In this case, the net penalty is only 2.5 percentage points, i.e. the ROR on an investment in a CTMP mill elsewhere could be expected to be 13.0%.

5. Constraints on shipping imposed by winter navigation conditions in Lake Melville assumed in the model, i.e. the requirement for specialized icebreaking cargo vessels and somewhat higher shipping inventories, have very little impact on the attractiveness of either a newsprint mill or CTMP mill investment.

Even if the shipping season could not be extended beyond the present six months, it would impose a very small direct economic penalty in terms of added working capital required for inventories but could mean insurmountable problems in marketing product and in CTMP quality deterioration.

6. Debt financing presently provides the most cost effective means from Government's point of view, for increasing the attractiveness of a newsprint mill or CTMP mill investment. Government should encourage an investor to maximize his leverage and can, if necessary, provide loan guarantees in support of this. Debt financing could push the ROR of the newsprint base case to 17.4% which is in excess of that necessary to overcome penalties associated with locating in Labrador, but could only increase that of the CTMP base case to 12.2%. Additional ways of increasing the attractiveness of a CTMP mill investment must be considered and may also be necessary for a newsprint mill investment depending on interest rates and the ability of an investor to obtain financing.

7. The Province can positively affect the attractiveness of these investments by reductions in the Provincial sales tax and the Provincial corporate tax. This

form of financial incentive is preferable over direct grants or subsidies as it does not incur direct, out of pocket expenses, although there are opportunity costs involved. The maximum leverage afforded by these items is sufficient to push the ROR for a newsprint mill investment over the hurdle rate, i.e. by 2.4 percentage points to 15.9%, but not to overcome the penalties associated with a Labrador location. For a CTMP mill investment, this leverage amounts to only 2.0 percentage points - well short of that required to reach the hurdle rate. Therefore, grants or subsidies would likely need to be considered.

8. Power rates are the most logical candidate for subsidization as it is directly controlled by the Province and, in this situation, future costs are relatively well known. The maximum leverage afforded by this would be 1.0 percentage point on the ROR for the newsprint base case and 1.6 percentage points on that for the CTMP base case. This corresponds to fully subsidizing power rates over the life of the project which in $1983 terms amounts to about $55 million. If this amount was instead made available as a capital grant up front, the leverage thus provided would amount to 1.8 percentage points on the ROR for the newsprint base case and 2.1 percentage points on that

for the CTMP base case. Power rates are already considered to be attractive because they do not increase over the life of the project and the low incremental benefit from subsidizing power makes it an inefficient means of providing financial incentives to these projects.

9. Capital grants provide the greatest potential for levering the attractiveness of these investments through financial assistance. The maximum level of grants available in the Goose Bay area of Labrador under the Industrial Regional Development Program, (IRDP), administered by the Federal Department of Regional Industrial Expansion (DRIE), is sufficient to push ROR for these investments over the hurdle rate and overcome locational penalties associated with Labrador without any other form of financial assistance or even debt financing. Federal participation in this manner would be welcome given the Province's limited fiscal capacity from which to provide grants, however, the extent to which the Federal Government is willing to do so - if at all - is uncertain.

10. There is real potential for increases in the price of CTMP of 20% to 50% over levels assumed in the base cases which would make a CTMP mill investment consid-

erably more attractive than a newsprint mill investment. CTMP and newsprint should therefore be promoted equally as potentially attractive investments for FMU 19.

11. Three observations can be made from the analysis regarding conditions conducive to developemnt of either a newsprint or CTMP mill in FMU 19.

- Markets must be concentrated in a geographical area to facilitate efficient use of a dedicated ice-breaking cargo vessel for transporting product. A captive market is preferred in order to maintain high operating rates. A CTMP mill supplying Scandanavian paper producers with fibre to offset local shortfalls in wood supply is perceived to have the greatest potential for achieving these conditions.

- An investor in either of these projects should be in a low debt/equity situation in order to obtain maximum debt financing.

- If the value of the Canadian dollar relative to the U.S. dollar recovers significantly, it would seriously undermine the attractiveness of these investments.

- Either of these projects would have significant unused tax deductions and credits which could be transferred to other operations and is, therefore, a consideration in identifying potential investors.

12. The analysis to this point has been useful in identifying the bounds within which the projects can be attractive investments. This is adequate for the stated purpose of promoting these projects but not as the basis for an investment decision because it does not predict the probability of these projects actually being within these bounds. Once a specific development proposal emerges, therefore, a risk analysis would be appropriate both for the investor and Government as the guide for making financial decisions about the project.

The risk analysis should look at the probability distribution of those input variables to which the investment attractiveness has been shown to be most sensitive, eg. product price, currency exchange rate(s), operating rate(s), plant and wharf capital cost, and wood cost. The first three should be addressed by an extensive market study while a reasonably detailed engineering study should be undertaken to refine capital cost estimates. Wood cost may have to be considered more subjectively, however, because of the lack of actual data.

BIBLIOGRAPHY

1. Acres Consulting Services Limited in association with NORDCO Limited; Lake Melville Winter Navigation Incremental Cost Study, final report; prepared for Department of Development, Government of Newfoundland and Labrador; St. John's; July, 1982.

2. Allan, S.W.; Labrador Woods Operations; facsimile; March, 1977.

3. ARCO Aluminum and Department of Development, Government of Newfoundland and Labrador; Newfoundland Greenfield Aluminum Smelter Joint Feasibility Study; St. John's; April, 1983.

4. Author unknown, Information Memorandum, Labrador Linerboard Limited, Stephenville, Newfoundland, Canada; 1977.

5. Author unkonwn, Labrador Resource Development and Transportation Plan, Phase 1 Report; Government of Newfoundland and Labrador; St. John's; May, 1981.

6. Author unknown; Pulping Characteristics of Black Spruce; Department of Forest Resources and Lands, Government of Newfoundland and Labrador; St. John's; no date.

7. Author unknown; 1980 Manufacturing Cost Studies, Forest Products Industries, draft; facsimile; prepared for Forest Industries Development Committee, Department of Industry, Trade and Commerce, Government of Canada; Ottawa; June, 1982.

8. Chiang, T.I., and Kingsland, F.; The Feasibility of Establishing Thermo-Mechanical Market Pulp Mills in the Coastal Plains Region of the United States; Georgia Institute of Technology; prepared for Coastal Plains Regional Commission; Georgia; March, 1976.

9. EPS Consultants; FCS-EPS Decision Support System Reference Manual, version 2, volumes 1 and 2; April, 1982.

10. Fenco Lavalin Incorporated; Engineering Report and Capital Cost Estimates for Site Selection Study, Greenfield Aluiminum Reduction Facility, Newfoundland, Canada, volumes 1 and 2; prepared for Anaconda Aluminum Company; Montreal; August, 1982.

11. Fenco (Nfld.) Limited; Port Labrador Preliminary Engineering Report; prepared for Department of Public Works, Government of Newfoundland and Labrador; St. John's; January, 1980.

12. Fenco Newfoundland Limited - Lavalin; Engineering Report, Wharf - Preliminary Study, Greenfield Aluminum Reduction Facility, Newfoundland, Canada; prepared for Anaconda Aluminum Company; St. John's, October, 1982.

13. Gray, J.A.; The Trees Behind the Shore - the Forests and Forest Industries in Newfoundland and Labrador; Economic Council of Canada; Canadian Government Publishing Centre; Hull, Quebec; 1981.

14. Highlands Contracting Ltd.; Conceptual Harvesting Plan for Forest Management Unit 19, draft; prepared for Department of Forest Resources and Lands, Government of Newfoundland and Labrador; St. John's; March, 1983.

15. Madison's Canadian Lumber Reporter (Weekly periodical); volume 20, number 1 to volume 33, number 36; Madison's Canadian Lumber Reporter (1973) Limited; Vancouver; January 9, 1981 to September 9, 1983.

16. McKenzie, B.W.; Mineral Investment Decision Techniques; McGill University - Professional Development Seminars; Montreal; 1979.

17. NORDCO Limited; Lake Melville/Offshore Labrador Year Round Navigation Study, 1978-1979; prepared for Department of Development, Government of Newfoundland and Labrador; St. John's; January, 1980.

18. Paper Trade Journal (biweekly periodical); volume 165, number 1 to volume 167, number 17; Vance Publishing Corporation; New York; January 15, 1981 to September 30, 1983.

19. Project Management and Design (1974) Limited; Economical and Technical Feasibility Study, Sawmill Operation, Goose Bay, Labrador; prepared for Department of Industrial Development, Government of Newfoundland and Labrador; St. John's; September, 1978.

20. Sandwell Management Consultants Limited; Labrador Forest Industry Development, Phase 1 - Project Identification Study report X-4517; prepared for Department of Forestry and Agriculture, Government of Newfoundland and Labrador; Vancouver; May, 1979.

21. Sandwell Management Consultants Limited; Newfoundland Forest Industry Development Study, Phase 1 - Pre-Feasibility Study, report X4627; prepared for Department of Forest Resources and Lands, Government of Newfoundland and Labrador; Vancouver; April 1980.

22. Woodbridge, Reed and Associates Limited; Market Mechanical and Chemi-Mechanical Pulp: A Growth Opportunity for Canada; prepared for Department of Supply and Services in conjunction with Environment Canada, Canadian Forestry Service, Government of Canada; Ottawa; August, 1982.

23. Woods, Gordon & Company; Labrador Linerboard Limited Divestiture Committee - Selling Group Progress Report; prepared for the Government of Newfoundland and Labrador; St. John's; January, 1978.

APPENDIX A

LISTING OF THE COMPUTER MODEL

The Computer Modelling System (FCS-EPS)

The computer program for this model was written by the author using the FCS-EPS modelling system (version 2.29) installed at Newfoundland and Labrador Computer Services (NLCS), St. John's. FCS-EPS stands for Financial and Corporate Planning System developed by EPS Consultants Limited, an English company which offers management services to business, industry, and governments worldwide. It is "a financial model building, planning and data management system designed to help the planner or analyst solve all types of planning, information and resource problems, eg. investment appraisals, long term plans, budget preparation and review, consolidations, marketing models and financial information systems."[1]

FCS-EPS is used by many large corporations worldwide; here, Newfoundland Hydro has the system installed on their mainframe computer and uses it for a wide variety of applications in many aspects of its operations. The Department of Development was the first major user of FCS-EPS at NLCS. The forest industry model was the first of several applications developed in-house which include models of fish processing operations, an aluminum smelter, and a zinc smelter.

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1. EPS Consultants, FCS-EPS Decision Support System, Reference Manual, version 2, volume 1, April, 1982; pp. 1.1.

The basis of models in FCS-EPS is a data matrix in which rows generally correspond to inputs and calculated variables and columns correspond to the periods in which these occur, eg. months, years. Models essentially consist of three parts - logic, data and report specifications - which are stored in separate files within the computer. Logic files define the inputs and specify the way in which rows and columns, or parts thereof, are to be manipulated to arrive at the desired output. Data files contain specified values for input variables, while report files indicate the format in which desired output is to be presented. A variety of commands are available which perform the calculations and carry out sensitivity or statistical analysis, forecasts, etc.

A listing of the logic file for the forest industry model follows along with a flow chart (Figure 15).

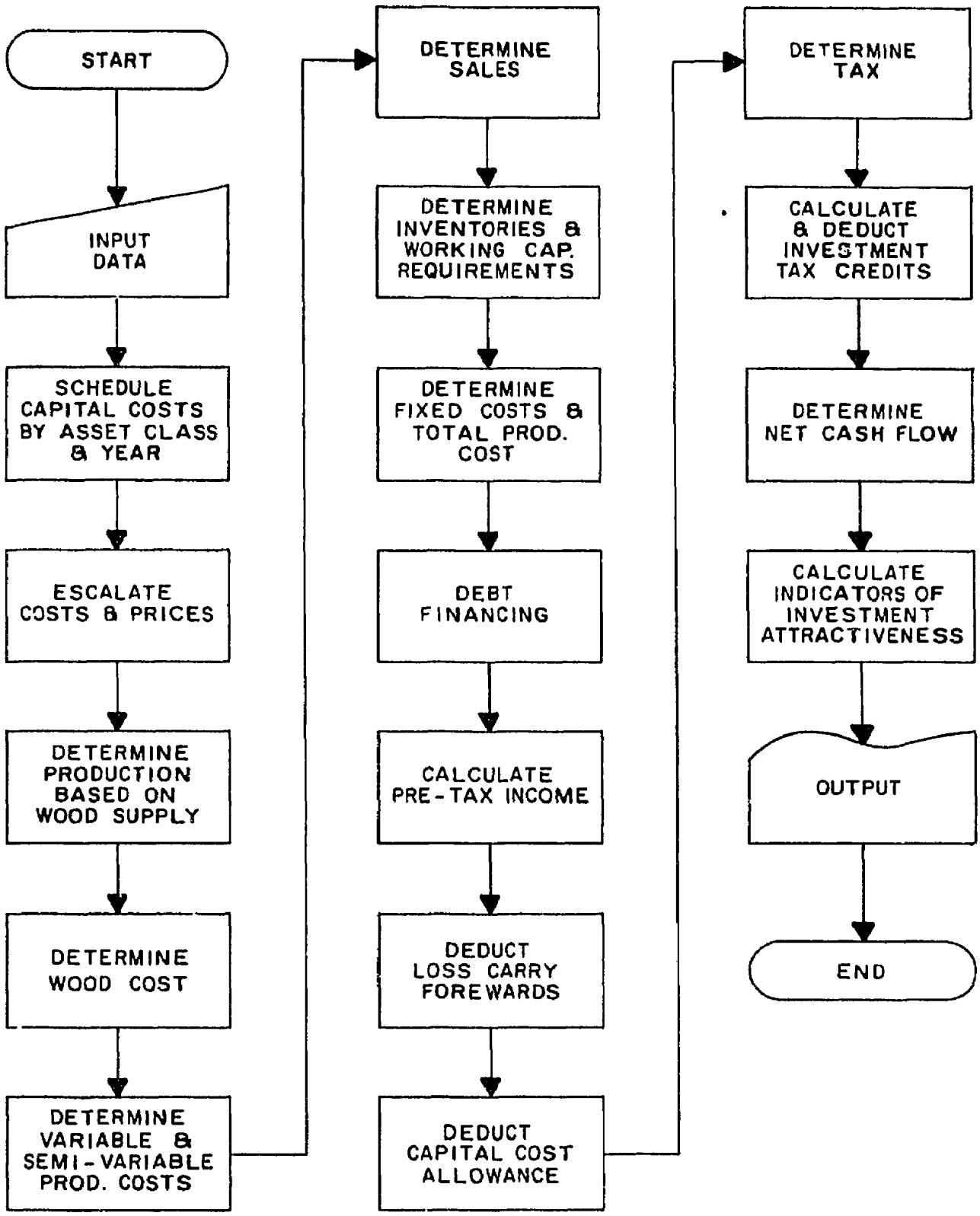

FIGURE 15 - FOREST INDUSTRY MODEL FLOW CHART

```
:
:      ************************************************************
:      *                                                          *
:      *          LABRADOR FOREST INDUSTRY CASH FLOW MODEL        *
:      *                                                          *
:      *     THIS PROGRAM USES THE FCS-EPS FINANCIAL MODELLING    *
:      *   SYSTEM INSTALLED AT NLCS TO EVALUATE FOUR OPTIONS FOR A*
:      *   FOREST INDUSTRY DEVELOPMENT IN LABRADOR -              *
:      *      1. NEWSPRINT MILL + SAWMILL                         *
:      *      2. NEWSPRINT MILL                                   *
:      *      3. CTMP MILL + SAWMILL                              *
:      *      4. CTMP MILL                                        *
:      *                                                          *
:      *     EACH OPTION USES THE SAME BASIC LOGIC (/FIMLOG) BUT  *
:      *   DIFFERENT INPUT DATA (/FIMDAT1 TO /FIMDAT4 RESPECTIVELY).*
:      *   /FIMLOGS IS A SLIGHTLY MODIFIED VERSION OF THE LOGIC USED*
:      *   WHEN PULP OR PAPER PRICES ARE SPECIFIED ON F.O.B. PLANT  *
:      *   BASIS RATHER THAN THE USUAL C.I.F. CUSTOMER BASIS. REPORT*
:      *   SPECIFICATIONS ARE UNDER /FIMREP.                      *
:      *                                                          *
:      *     THE MODEL COMPUTES THE AFTER TAX CASH FLOWS OVER A 30*
:      *   YEAR PERIOD (PRESENTLY BEGINNING IN 1983). A DEBT      *
:      *   FINANCING CAPABILITY HAS BEEN BUILT IN. THE FOLLOWING  *
:      *   INVESTMENT CRITERIA ARE PROVIDED -                     *
:      *      - % RATE OF RETURN (ROR)                            *
:      *      - NET PRESENT VALUE (NPV). DISCOUNT RATE 10%        *
:      *      - NET PRESENT VALUE (NPV). DISCOUNT RATE 15%        *
:      *      - PAYBACK PERIOD (YEARS: UNDISCOUNTED)              *
:      *                                                          *
:      *                              WRITTEN BY - DOUGLAS B. MOODY*
:      *                              LAST REVISED - SEPTEMBER 21,1983*
:      *                                                          *
:      ************************************************************
:
:        INPUT DATA ROW DEFINITIONS
:        ('*' INDICATES BASE YEAR CONSTANT DOLLAR VALUES)
:
:        RESOURCE DATA
  'ANNUAL CUT'            ANNUAL SUSTAINABLE WOOD HARVEST (M3)
  'SAWLOG PORTION'        SAWMILL WOOD ALLOCATION (PORTION OF ANNUAL CUT)
  'WOOD DENSITY'          WEIGHTED AVG WOOD DENSITY (DOT/M3)
:
:        PULP/PAPER MILL CAPITAL COSTS
  'PM CAP COST*'          TOTAL CAPITAL COST PULP/PAPER MILL PLANT
  'PM BLDG %'             SCHEDULE OF EXPENDITURES FOR BUILDINGS & STRUCTURES BY YEAR
  'PM MFG EQP %'          SCHEDULE OF EXPENDITURES FOR MANUFACTURING EQUIPMENT BY YEAR
  'PM OTH EQP %'          SCHEDULE OF EXPENDITURES FOR OTHER EQUIPMENT BY YEAR
:
:        WHARF CAPITAL COSTS
  'WF CAP COST*'          TOTAL CAPITAL COST WHARF
  'WHARF %'               SCHEDULE OF EXPENDITURES BY YEAR
:
:        SAWMILL CAPITAL COSTS
  'SM CAP COST*'          TOTAL CAPITAL COST SAWMILL PLANT
  'SM BLDG %'             SCHEDULE OF EXPENDITURES FOR BUILDINGS & STRUCTURES BY YEAR
  'SM MFG EQP %'          SCHEDULE OF EXPENDITURES FOR MANUFACTURING EQUIPMENT BY YEAR
  'SM OTH EQP %'          SCHEDULE OF EXPENDITURES FOR OTHER EQUIPMENT BY YEAR
:
:        WOODLANDS CAPITAL COSTS
  'WD CAMP COST*'         CAMP BUILDINGS & STRUCTURES CAPITAL COST BY YEAR
```

```
129    *WD MOB EQP COST*       MOBILE EQUIPMENT CAPITAL COST BY YEAR
130    *WD ROADS COST*         ROADS & BRIDGES CAPITAL COST BY YEAR
140 ;
141 ;          PULP/PAPER MILL OPERATING DATA
142    *PRODUCT H2O*           PRODUCT MOISTURE CONTENT (DF)
143    *PRODUCT SBK*           PRODUCT SBK PULP CONTENT (DF)
144    *PRODUCT YIELD*         PRODUCT FIBRE YIELD (DF)
145    *SBK LOSS*              SBK PULP LOSS (DF)
146    *PM OP DAYS*            MILL ANNUAL OPERATING DAYS (NORMAL 350)
147    *PM OP EFFICIENCY*      MILL OPERATING EFFICIENCY (NORMAL 0.95)
148    *PM ELEC USAGE*         ELECTRICITY USAGE RATE (MWH/FT)
149    *PM FUEL USAGE*         FUEL USAGE RATE (L/FT)
150    *PM CHEM COST/FT*       CHEMICALS USAGE ($/FT)
151    *PM PKG COST/FT*        PACKAGING SUPPLIES USAGE ($/FT)
152    *PM PRTS COST/FT*       OPERATING & MAINTENANCE SUPPLIES USAGE ($/FT)
160 ;
161 ;          SAWMILL OPERATING DATA
162    *LUMBER YIELD*          LUMBER YIELD (DF)
163    *CHIP YIELD*            WOOD CHIP YIELD (DF)
164    *SM OP DAYS*            MILL ANNUAL OPERATING DAYS (NORMAL 250)
165    *SM OP EFFICIENCY*      MILL OPERATING EFFICIENCY (NORMAL 0.95)
166    *SM ELEC USAGE*         ELECTRICITY USAGE RATE (MWH/M3)
167    *SM FUEL USAGE*         FUEL USAGE RATE (L/M3)
168    *SM PRTS COST/M3*       OPERATING & MAINTENANCE SUPPLIES USAGE ($/M3)
170 ;
171 ;          WOODLANDS OPERATING DATA
172    *WD FUEL COST/M3*       FUEL, OIL & LUBE USAGE ($/M3)
173    *WD PRTS COST/M3*       SUPPLIES, PARTS & SERVICES USAGE ($/M3)
174    *STUMPAGE/M3*           STUMPAGE RATE ($/M3)
180 ;
181 ;          COMMODITY PRICES
182    *ELEC PRICE*            ELECTRICITY PRICE ($/MWH)
183    *FUEL PRICE*            FUEL PRICE ($/L)
184    *SBK PRICE*             SBK PULP PRICE ($/ADT)
190 ;
191 ;          PULP/PAPER MILL PAYROLL
192    *PM HRLY EMP*           NUMBER OF HOURLY EMPLOYEES
193    *PM HRLY WAGE*          AVG WAGE + BENEFITS OF HOURLY EMPLOYEES
194    *PM SALARIED EMP*       NUMBER OF MILL SALARIED EMPLOYEES
195    *PM SALARY*             AVG SALARY + BENEFITS OF SALARIED EMPLOYEES
200 ;
201 ;          SAWMILL PAYROLL
202    *SM HRLY EMP*           NUMBER OF HOURLY EMPLOYEES
203    *SM HRLY WAGE*          AVG WAGE + BENEFITS OF HOURLY EMPLOYEES
204    *SM SALARIED EMP*       NUMBER OF MILL SALARIED EMPLOYEES
205    *SM SALARY*             AVG SALARY + BENEFITS OF SALARIED EMPLOYEES
210 ;
211 ;          WOODLANDS PAYROLL.
212    *WD LAB COST/M3*        HARVESTING, MAINT & CAMP LABOR ($/M3)
213    *WD SALARIED EMP*       NUMBER OF SALARIED EMPLOYEES
214    *WD SALARY*             AVG SALARY + BENEFITS OF SALARIED EMPLOYEES
220 ;
221 ;          MILL OVERHEAD COSTS
222    *GEN & ADMN COST*       GENERAL & ADMINISTRATIVE COSTS EXCLUDING SALARIES
230 ;
231 ;          WOODLANDS OVERHEAD COSTS
232    *FOREST MGT COST*       TOTAL FOREST MANAGEMENT COSTS
240 ;
241 ;          SALES
242    *PRODUCT PRICE*         PRODUCT SELLING PRICE US$ C.I.F. MARKET
243    *LUMBER PRICE*          LUMBER SELLING PRICE US$ C.I.F. MARKET
```

```
244    'SHIPPING COST'          SHIPPING COST/TONNE (ICE-BREAKING VESSEL)
245    'TRUCKING COST'          TRUCKING COST/TONNE FROM PLANT TO WHARF
246    'SALES OVERHEAD'         SALES OVERHEAD (DF OF GROSS SALES REVENUE)
247    'CDN$ US$ EXCG'          CANADIAN TO U.S. CURRENCY EXCHANGE RATE
250 ;
251 ;         ESCALATORS (%)
252    'CP ESC'                 CONSUMER PRICE ESCALATOR
253    'GNP ESC'                GROSS NATIONAL PRODUCT ESCALATOR
254    'CHEM ESC'               CHEMICALS PRICE ESCALATOR
255    'ELEC ESC'               ELECTRIC POWER PRICE ESCALATOR
256    'FUEL ESC'               FUEL PRICE ESCALATOR
257    'SBK ESC'                SBK PULP PRICE ESCALATOR
258    'WAGE ESC'               WAGE/SALARY ESCALATOR
259    'PRODUCT ESC'            PRODUCT PRICE ESCALATOR
260    'LUMBER ESC'             LUMBER PRICE ESCALATOR
261    'BLDG & EQUIP ESC'       BUILDING & EQUIPMENT COST ESCALATOR
270 ;
271 ;         INVENTORY
272    'WOOD AVG INV'           WOOD AVG INVENTORY (DAYS)
273    'RAW MAT AVG INV'        RAW MATERIALS AVG INVENTORY (DAYS)
274    'FIN GDS AVG INV'        FINISHED PRODUCT AVG INVENTORY (DAYS)
275    'AVG RECEIVABLES'        AVG ACCOUNTS RECEIVABLE (DAYS)
276    'AVG PAYABLES'           AVG ACCOUNTS PAYABLE (DAYS)
280 ;
281 ;         DEBT FINANCING
282    '% STD FINANCING'        PORTION OF WORKING CAPITAL TO BE FINANCED
283    '% LTD FINANCING'        PORTION OF CAPITAL COST TO BE FINANCED
284    'STD RATE'               SHORT TERM DEBT RATE(S)
285    'LTD RATE'               LONG TERM DEBT RATE(S)
290 ;
291 ;         SENSITIVITY
292    'SENS FACTOR 1'          WOOD COST SENSITIVITY FACTOR
293    'SENS FACTOR 2'          PROVINCIAL CORPORATE TAX RATE SENSITIVTY FACTOR
300 ;
301 ;         CALCULATED VARIABLES ROW DEFINITIONS
302 ;
303 ;         CAPITAL COSTS
304    'PM BLDG COST'
305    'PM MFG EQP COST'
306    'PM OTH EQP COST'
307    'PM CAP COST'
308    'WF CAP COST'
309    'SM BLDG COST'
310    'SM MFG EQP COST'
311    'SM OTH EQP COST'
312    'SM CAP COST'
313    'WD CAMP COST'
314    'WD MOB EQP COST'
315    'WD ROADS COST'
316    'WD CAP COST'
317    'BLDG COST'
318    'MFG EQP COST'
319    'OTH EQP COST'
320    'TOTAL CAP COST'
330 ;
331 ;         ESCALATED COSTS & PRICES
332    'PM CHEM COST/FT'
333    'PM PKG COST/FT'
334    'PM PRTS COST/FT'
335    'SM PRTS COST/M3'
336    'WD FUEL COST/M3'
```

```
337    'WD PRTS COST/M3'
338    'STUMPAGE/M3'
339    'ELEC PRICE'
340    'FUEL PRICE'
341    'SBK PRICE'
342    'PM HRLY WAGE'
343    'PM SALARY'
344    'SM HRLY WAGE'
345    'SM SALARY'
346    'WD LAB COST/M3'
347    'WD SALARY'
348    'FOREST MGT COST'
349    'GEN & ADMN COST'
350    'PRODUCT PRICE'
351    'LUMBER PRICE'
360 :
361 :          PERIODS
362    'CONST START'
363    'CONST END'
364    'START-UP'
370 :
371 :          PRODUCTION
372    'SM PRODUCTION'
373    'CHIPS AVAILABLE'
374    'PM PRODUCTION'
375    'SM WOOD USAGE'
376    'PM WOOD USAGE'
377    'TOTAL WOOD USAGE'
380 :
381 :          WOOD COST
382    'WD VAR COST/M3'
383    'WD SALARY COST'
384    'WD INSUR COST'
385    'WD ASSETS'
386    'WD DEPRECIATION'
387    'WD OVERHEAD/M3'
388    'WOOD COST/M3'
390 :
391 :          VARIABLE PRODUCTION COSTS
392    'PM WOOD COST/FT'
393    'PM SBK COST/FT'
394    'PM ELEC COST/FT'
395    'PM FUEL COST/FT'
396    'PM LAB COST/FT'
397    'PM VAR COST/FT'
398    'SM WOOD COST/M3'
399    'SM ELEC COST/M3'
400    'SM FUEL COST/M3'
401    'SM LAB COST/M3'
402    'SM VAR COST/M3'
403 :
404 :          SEMI-VARIABLE PRODUCTION COSTS
405    'PM SALARY COST'
406    'SM SALARY COST'
420 :
421 :          SALES
422    'GROSS SALES'
423    'SELLING COST'
424    'DISTRIB COST'
425    'NET SALES'
430 :
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431 :          INVENTORIES & WORKING CAPITAL
432    'SPR PRTS WKG CAP'
433    'WORK WKG CAP'
434    'RAW MATERIALS'
435    'RAW MAT WKG CAP'
436    'FIN GDS WKG CAP'
437    'RCVBLS WKG CAP'
438    'PAYABLES WKG CAP'
439    'INVENTORY'
440    'WORKING CAPITAL'
441    'WKG CAP CHANGE'
450 :
451 :          FIXED COSTS
452    'PM ASSETS'
453    'PM DEPRECIATION'
454    'WF ASSETS'
455    'WF DEPRECIATION'
456    'SM ASSETS'
457    'SM DEPRECIATION'
458    'DEPRECIATION'
459    'PM PROPERTY TAX'
460    'SM PROPERTY TAX'
461    'PM INSUR COST'
462    'WF INSUR COST'
463    'SM INSUR COST'
470 :
471 :          MANUFACTURING COSTS
472    'PM OVERHEAD/FT'
473    'SM OVERHEAD/MJ'
474    'PM MFG COST/FT'
475    'SM MFG COST/MJ'
476    'TOTAL MFG COST'
480 :
481 :          DEBT FINANCING
482    'STD RE-FINANCING'
483    'WKG CAP CASH REQ'
484    'STD FINANCING'
485    'STD INTEREST'
486    'STD PAYMENT'
487    'STD CHANGE'
488    'STD BALANCE'
489    'STD SERVICING'
490    'STD REPAYMENT'
491    'WKG CAP NET REQ'
492    'LTD FINANCING'
493    'LTD INTEREST'
494    'LTD PAYMENT'
495    'LTD CHANGE'
496    'LTD BALANCE'
497    'LTD SERVICING'
498    'LTD REPAYMENT'
499    'CAPITAL NET REQ'
500    'DEBT SERVICING'
501    'DEBT BALANCE'
502    'NET ASSETS'
503    'DEBT RATIO'
504    'CURRENT RATIO'
505    'CASH REQUIRED'
506    'RESIDUAL VALUE'
510 :
511 :          LTD CARRY FORWARD
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512    'PRE-TAX INCOME'
513    'INV ALLOWANCE'
514    'LOSS ADDITION'
515    'TAXABLE INCOME'
516    'CUM LOSS'
517    'WRITEOFF'
518    'LOSS AVAILABLE'
519    'LOSS CARRY F/D'
520    'CUM LOSS USE'
530 :
531 :          CAPITAL COST ALLOWANCE
532    'BLDG CCA'
533    'BLDG POOL'
534    'X'
535    'Y'
536    'Z'
537    'CD'
538    'D'
539    'C'
540    'MFG EQP CCA'
541    'MFG EQP CCA POOL'
542    'OTH EQP CCA'
543    'OTH EQP POOL'
544    'WD CAMP CCA'
545    'WD CAMP POOL'
546    'WD MOB EQP CCA'
547    'WD MOB EQP POOL'
548    'WD ROADS CCA'
549    'WD ROADS POOL'
550    'CCA AVAILABLE'
551    'CCA'
560 :
561 :          INVESTMENT TAX CREDIT
562    'FEDERAL TAX'
563    'MAX ITC'
564    'ITC ADDITION'
565    'CUM ITC'
566    'CUM ITC USE'
567    'ITC LOST'
568    'ITC AVAILABLE'
569    'ITC'
570    'ITC ADJUSTMENT'
580 :
581 :          CASH FLOW
582    'GROSS TAX'
583    'NET TAX PAYABLE'
584    'OP CASH FLOW'
585    'NET CASH FLOW'
586 :
587 :          FINANCIAL INDICATORS
588    'ROR'
589    'NPV 10%'
590    'NPV 15%'
591    'DUMMY CASH FLOW'
592    'PAYBACK'
600 :
601 :          START
602 :
603 :          SCHEDULE & ESCALATE CAPITAL EXPENDITURES
604 :
605 :  'PM BLDG COST' = ('PM CAP COST'*'PM BLDG %') COMP 'BLDG & EQUIP ESC'
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606 ;  'PM MFG EQP COST' = ('PM CAP COST'*'PM MFG EQP %') COMP 'BLDG & EQUIP ESC'
607 ;  'PM OTH EQP COST' = ('PM CAP COST'*'PM OTH EQP %') COMP 'BLDG & EQUIP ESC'
608 ;  'PM CAP COST' = 'PM BLDG COST'+'PM MFG EQP COST'+'PM OTH EQP COST'
609 ;
610 ;  'WF CAP COST' = ('WF CAP COST'*'WHARF %') COMP 'BLDG & EQUIP ESC'
611 ;
612 ;  'SM BLDG COST' = ('SM CAP COST'*'SM BLDG %') COMP 'BLDG & EQUIP ESC'
613 ;  'SM MFG EQP COST' = ('SM CAP COST'*'SM MFG EQP %') COMP 'BLDG & EQUIP ESC'
614 ;  'SM OTH EQP COST' = ('SM CAP COST'*'SM OTH EQP %') COMP 'BLDG & EQUIP ESC'
615 ;  'SM CAP COST' = 'SM BLDG COST'+'SM MFG EQP COST'+'SM OTH EQP COST'
616 ;
617 ;  'WD CAMP COST' = 'WD CAMP COST*' COMP 'BLDG & EQUIP ESC'
618 ;  'WD MOB EQP COST' = 'WD MOB EQP COST*' COMP 'CP ESC'
619 ;  'WD ROADS COST' = 'WD ROADS COST*' COMP 'GNP ESC'
620 ;  'WD CAP COST' = 'WD CAMP COST'+'WD MOB EQP COST'+'WD ROADS COST'
621 ;
622 ;  'BLDG COST' = 'PM BLDG COST'+'SM BLDG COST'+'WF CAP COST'
623 ;  'MFG EQP COST' = 'PM MFG EQP COST'+'SM MFG EQP COST'
624 ;  'OTH EQP COST' = 'PM OTH EQP COST'+'SM OTH EQP COST'
625 ;  'TOTAL CAP COST' = 'PM CAP COST'+'WF CAP COST'+'SM CAP COST'+'WD CAP COST'
640 ;
641 ;        ESCALATE OTHER COST & PRICE INPUTS
642 ;
643 ;  'PM CHEM COST/FT' = 'PM CHEM COST/FT*' COMP 'CHEM ESC'
644 ;  'PM PKG COST/FT' = 'PM PKG COST/FT*' COMP 'CP ESC'
645 ;  'PM PRTS COST/FT' = 'PM PRTS COST/FT*' COMP 'CP ESC'
646 ;  'SM PRTS COST/M3' = 'SM PRTS COST/M3*' COMP 'CP ESC'
647 ;  'WD FUEL COST/M3' = 'WD FUEL COST/M3*' COMP 'FUEL ESC'
648 ;  'WD PRTS COST/M3' = 'WD PRTS COST/M3*' COMP 'CP ESC'
649 ;  'STUMPAGE/M3' = 'STUMPAGE/M3*' COMP 'GNP ESC'
650 ;  'ELEC PRICE' = 'ELEC PRICE*' COMP 'ELEC ESC'
651 ;  'FUEL PRICE' = 'FUEL PRICE*' COMP 'FUEL ESC'
652 ;  'SBK PRICE' = ('SBK PRICE*' COMP 'SBK ESC')/'CON$ US$ EXCG'
653 ;  'PM HRLY WAGE' = 'PM HRLY WAGE*' COMP 'WAGE ESC'
654 ;  'PM SALARY' = 'PM SALARY*' COMP 'WAGE ESC'
655 ;  'SM HRLY WAGE' = 'SM HRLY WAGE*' COMP 'WAGE ESC'
656 ;  'SM SALARY' = 'SM SALARY*' COMP 'WAGE ESC'
657 ;  'WD LAB COST/M3' = 'WD LAB COST/M3*' COMP 'WAGE ESC'
658 ;  'WD SALARY' = 'WD SALARY*' COMP 'WAGE ESC'
659 ;  'FOREST MGT COST' = 'FOREST MGT COST*' COMP 'GNP ESC'
660 ;  'GEN & ADMN COST' = 'GEN & ADMN COST*' COMP 'GNP ESC'
661 ;  'PRODUCT PRICE' = ('PRODUCT PRICE*' COMP 'PRODUCT ESC')/'CON$ US$ EXCG'
662 ;  'LUMBER PRICE' = ('LUMBER PRICE*' COMP 'LUMBER ESC')/'CON$ US$ EXCG'
670 ;
671 ;        PERIODS
672 ;
673 ;  'CONST START' = 4.;'CONST END' = 6.;'START-UP' = 7.
674 ;
675 ;        DETERMINE PRODUCTION BASED ON WOOD SUPPLY
676 ;
677 ;  'SM PRODUCTION' = 'ANNUAL CUT'*'SAWLOG PORTION'*'LUMBER YIELD'*'SM OP DAYS'*'SM OP EFFICIENCY'/(250.0*0.95)
678 ;  'CHIPS AVAILABLE' = 'SM PRODUCTION'*'CHIP YIELD'/'LUMBER YIELD'
679 ;  'PM PRODUCTION' = (('ANNUAL CUT'*(1.0-'SAWLOG PORTION'))+'CHIPS AVAILABLE')*'WOOD DENSITY'*'PRODUCT YIELD'*'PM OP DAYS'*'PM
OP EFFICIENCY'/((1.0-'PRODUCT H2O')*(1.0-'PRODUCT SBK')*250.0*0.95)
680 ;  'SM WOOD USAGE' = ('SM PRODUCTION'/'LUMBER YIELD')-'CHIPS AVAILABLE'
681 ;  'PM WOOD USAGE' = ('PM PRODUCTION'*(1.0-'PRODUCT H2O')*(1.0-'PRODUCT SBK')/('WOOD DENSITY'*'PRODUCT YIELD'))
682 ;  'TOTAL WOOD USAGE' = 'PM WOOD USAGE'+'SM WOOD USAGE'
690 ;
691 ;        WOOD COST
692 ;
693 ;  'WD VAR COST/M3' = 'WD FUEL COST/M3'+'WD PRTS COST/M3'+'STUMPAGE/M3'+'WD LAB COST/M3'
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 694 ;   'WD SALARY COST' = 'WD SALARIED EMP'*'WD SALARY'
 695 ;   'WD INSUR COST' = ((0.025*('WD CAMP COST'+'WD MOB EQP COST')) COL 6.) FOR 'START-UP' TO 30.;'WD INSUR COST' = 'WD INSUR CO
ST' COMP 'CP ESC'
 696 ;   'WD ASSETS' = ('WD CAP COST' THRU 'START-UP') FOR 'START-UP';'WD ASSETS' = 'WD CAP COST' FOR 8. TO 30.;'WD DEPRECIATION' = D
ECLINE('WD ASSETS',6.667)
 697 ;   'WD OVERHEAD/M3' = ('FOREST MGT COST'+'WD SALARY COST'+'WD INSUR COST'+'WD DEPRECIATION')/'TOTAL WOOD USAGE'
 698 ;   'WOOD COST/M3' = ('WD VAR COST/M3'+'WD OVERHEAD/M3')*'SENS FACTOR 1'
 710 ;
 711 ;         VARIABLE PRODUCTION COSTS
 712 ;
 713 ;   'PM WOOD COST/FT' = ('PM WOOD USAGE'*'WOOD COST/M3')/'PM PRODUCTION'
 714 ;   'PM SBK COST/FT' = 'PRODUCT SBK'*'SBK PRICE'/((1.0-'SBK LOSS')*0.9)
 715 ;   'PM ELEC COST/FT' = 'PM ELEC USAGE'*'ELEC PRICE'
 716 ;   'PM FUEL COST/FT' = 'PM FUEL USAGE'*'FUEL PRICE'
 717 ;   'PM LAB COST/FT' = 'PM HRLY EMP'*2080.0*'PM HRLY WAGE'*'PM OP DAYS'/(350.0*'PM PRODUCTION')
 718 ;   'PM VAR COST/FT' = 'PM WOOD COST/FT'+'PM SBK COST/FT'+'PM ELEC COST/FT'+'PM FUEL COST/FT'+'PM CHEM COST/FT'+'PM LAB COST/FT'
+'PM PKG COST/FT'+'PM PRTS COST/FT'
 719 ;
 720 ;   'SM WOOD COST/M3' = ('SM WOOD USAGE'*'WOOD COST/M3')/'SM PRODUCTION'
 721 ;   'SM ELEC COST/M3' = 'SM ELEC USAGE'*'ELEC PRICE'
 722 ;   'SM FUEL COST/M3' = 'SM FUEL USAGE'*'FUEL PRICE'
 723 ;   'SM LAB COST/M3' = 'SM HRLY EMP'*2080.0*'SM HRLY WAGE'*'SM OP DAYS'/(250.0*'SM PRODUCTION')
 724 ;   'SM VAR COST/M3' = 'SM WOOD COST/M3'+'SM ELEC COST/M3'+'SM FUEL COST/M3'+'SM LAB COST/M3'+'SM PRTS COST/M3'
 725 ;
 726 ;         SEMI-VARIABLE PRODUCTION COSTS
 727 ;
 728 ;   'PM SALARY COST' = 'PM SALARIED EMP'*'PM SALARY'
 729 ;   'SM SALARY COST' = 'SM SALARIED EMP'*'SM SALARY'
 740 ;
 741 ;         SALES
 742 ;
 743 ;   'GROSS SALES' = ('PM PRODUCTION'*'PRODUCT PRICE')+('SM PRODUCTION'*'LUMBER PRICE')
 744 ;   'SELLING COST' = 'GROSS SALES'*'SALES OVERHEAD'
 745 ;   'DISTRIB COST' = ('PM PRODUCTION'+('SM PRODUCTION'/2.5))*('SHIPPING COST'+'TRUCKING COST')
 746 ;   'NET SALES' = 'GROSS SALES'-'SELLING COST'-'DISTRIB COST'
 750 ;
 751 ;         INVENTORIES & WORKING CAPITAL
 752 ;
 753 ;   'SPR PRTS WKG CAP' = (0.015*('PM CAP COST'+'SM CAP COST')) FOR 'START-UP' TO 30.;'SPR PRTS WKG CAP' = 'SPR PRTS WKG CAP' C
OMP 'CP ESC'
 754 ;   'WOOD WKG CAP' = ('WOOD AVG INV'/365.0)*(('TOTAL WOOD USAGE'*'WD VAR COST/M3'*0.82)+'WD SALARY COST')
 755 ;   'RAW MATERIALS' = ('TOTAL WOOD USAGE'*'WD FUEL COST/M3')+('PM PRODUCTION'*('PM SBK COST/FT'+'PM FUEL COST/FT'+'PM CHEM COST/
FT'+'PM PKG COST/FT'))+('SM PRODUCTION'*'SM FUEL COST/M3')
 756 ;   'RAW MAT WKG CAP' = ('RAW MAT AVG INV'/365.0)*'RAW MATERIALS'
 757 ;   'FIN GDS WKG CAP' = ('FIN GDS AVG INV'/365.0)*(('PM PRODUCTION'*'PM VAR COST/FT')+('SM PRODUCTION'*'SM VAR COST/M3')+'PM SAL
ARY COST'+'SM SALARY COST')
 758 ;   'RCVBLS WKG CAP' = ('AVG RECEIVABLES'*'NET SALES')/365.0
 759 ;   'PAYABLES WKG CAP' = ('AVG PAYABLES'/365.0)*(('PM PRODUCTION'*'PM VAR COST/FT')+('SM PRODUCTION'*'SM VAR COST/M3')+'PM SALAR
Y COST'+'SM SALARY COST')
 760 ;
 761 ;   'INVENTORY' = 'SPR PRTS WKG CAP'+'WOOD WKG CAP'+'RAW MAT WKG CAP'+'FIN GDS WKG CAP'
 762 ;   'WORKING CAPITAL' = 'SPR PRTS WKG CAP'+'WOOD WKG CAP'+'RAW MAT WKG CAP'+'FIN GDS WKG CAP'+'RCVBLS WKG CAP'-'PAYABLES WKG CAP
'
 763 ;   'WKG CAP CHANGE' = 'WORKING CAPITAL'-'WORKING CAPITAL' LAG 1.
 770 ;
 771 ;         FIXED COSTS
 772 ;
 773 ;   'PM ASSETS' = ('PM CAP COST' THRU 'START-UP') FOR 'START-UP';'PM ASSETS' = 'PM CAP COST' FOR 8. TO 30.;'PM DEPRECIATION' = L
INEAR('PM ASSETS',20.)
 774 ;   'WF ASSETS' = ('WF CAP COST' THRU 'START-UP') FOR 'START-UP';'WF ASSETS' = 'WF CAP COST' FOR 8. TO 30.;'WF DEPRECIATION' = L
INEAR('WF ASSETS',20.)
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 775 :  'SM ASSETS' = ('SM CAP COST' THRU 'START-UP') FOR 'START-UP';'SM ASSETS' = 'SM CAP COST' FOR 0. TO 30.;'SM DEPRECIATION' = L
INEAR('SM ASSETS',20.)
 776 :  'DEPRECIATION' = 'PM DEPRECIATION'+'SM DEPRECIATION'+'WD DEPRECIATION'
 777 :
 778 :  'PM PROPERTY TAX' = (0.0025*'PM CAP COST*') FOR 'START-UP' TO 30.;'PM PROPERTY TAX' = 'PM PROPERTY TAX' COMP 'GNP ESC'
 779 :  'SM PROPERTY TAX' = (0.0025*'SM CAP COST*') FOR 'START-UP' TO 30.;'SM PROPERTY TAX' = 'SM PROPERTY TAX' COMP 'GNP ESC'
 780 :  'PM INSUR COST' = (0.005*'PM CAP COST*') FOR 'START-UP' TO 30.;'PM INSUR COST' = ('PM INSUR COST' COMP 'GNP ESC')+(0.005*'PM
WOOD USAGE'/'TOTAL WOOD USAGE'*'INVENTORY')
 781 :  'WF INSUR COST' = (0.005*'WF CAP COST*') FOR 'START-UP' TO 30.;'WF INSUR COST' = 'WF INSUR COST' COMP 'GNP ESC'
 782 :  'SM INSUR COST' = (0.005*'SM CAP COST*') FOR 'START-UP' TO 30.;'SM INSUR COST' = ('SM INSUR COST' COMP 'GNP ESC')+(0.005*'SM
WOOD USAGE'/'TOTAL WOOD USAGE'*'INVENTORY')
 790 :
 791 :          MANUFACTURING COSTS
 792 :
 793 :  'PM OVERHEAD/FT' = ('PM SALARY COST'+'PM DEPRECIATION'+'PM PROPERTY TAX'+'PM INSUR COST')/'PM PRODUCTION'
 794 :  'SM OVERHEAD/M3' = ('SM SALARY COST'+'SM DEPRECIATION'+'SM PROPERTY TAX'+'SM INSUR COST')/'SM PRODUCTION'
 795 :  'PM MFG COST/FT' = 'PM VAR COST/FT'+'PM OVERHEAD/FT'
 796 :  'SM MFG COST/M3' = 'SM VAR COST/M3'+'SM OVERHEAD/M3'
 797 :  'TOTAL MFG COST' = ('PM PRODUCTION'*'PM MFG COST/FT')+('SM PRODUCTION'*'SM MFG COST/M3')
 800 :
 801 :          DEBT FINANCING
 802 :
 803    BYCOLUMN(1.,30.)
 804 :  'STD RE-FINANCING' = 'STD FINANCING' LAG 1.
 805 :  'WKG CAP CASH REQ' = 'WKG CAP CHANGE'+'STD RE-FINANCING'
 806 :  'STD FINANCING' = ('% STD FINANCING'*'WKG CAP CASH REQ') FOR 'START-UP' TO 30.
 807    CONTINUE
 808    'STD LOAN' = LOAN('STD FINANCING','STD RATE',1.,1.,3.)
 812 :  'STD INTEREST' = 808
 813 :  'STD PAYMENT' = 809
 814 :  'STD CHANGE' = 810
 815 :  'STD BALANCE' = 811
 816 :  IF('STD CHANGE' LT 0.0)('STD SERVICING' = 'STD PAYMENT';'STD REPAYMENT' = 0.0)   ELSE ('STD SERVICING' = 'STD INTEREST';'STD
REPAYMENT' = 'STD CHANGE')
 817 :  'WKG CAP NET REQ' = 'WKG CAP CASH REQ'-'STD FINANCING'
 818 :
 819 :  'LTD FINANCING' = ('% LTD FINANCING'*'TOTAL CAP COST') FOR 'CONST START' TO 'CONST END'
 820    'LTD LOAN' = LOAN('LTD FINANCING','LTD RATE',20.,1.,3.,12.,1.,1.,2.,1.)
 824 :  'LTD INTEREST' = 820
 825 :  'LTD PAYMENT' = 821
 826 :  'LTD CHANGE' = 822
 827 :  'LTD BALANCE' = 823
 828 :  IF('LTD CHANGE' LT 0.0) ('LTD SERVICING' = 'LTD PAYMENT';'LTD REPAYMENT' = 0.0)   ELSE ('LTD SERVICING' = 'LTD INTEREST';'LT
D REPAYMENT' = 'LTD CHANGE')
 829 :  'CAPITAL NET REQ' = 'TOTAL CAP COST'-'LTD FINANCING'+'LTD REPAYMENT'
 830 :
 831 :  'DEBT SERVICING' = 'STD SERVICING'+'LTD SERVICING'
 832 :  'DEBT BALANCE' = 'STD FINANCING' +'LTD BALANCE'
 833 :  'NET ASSETS' = ('TOTAL CAP COST' THRU 30.)-('DEPRECIATION' THRU 30.)-('WF DEPRECIATION' THRU 30.)+'INVENTORY'+'RCVBLS WKG CA
P'-'PAYABLES WKG CAP'
 834 :  'DEBT RATIO' = 'DEBT BALANCE'/'NET ASSETS'
 835 :  'CURRENT RATIO' = ('INVENTORY'+'RCVBLS WKG CAP')/('LTD REPAYMENT' LEAD 1.+'STD FINANCING'+'PAYABLES WKG CAP')
 836 :  'CASH REQUIRED' = 'CAPITAL NET REQ'+'WKG CAP NET REQ'
 837 :  'RESIDUAL VALUE' = ('WORKING CAPITAL'-'STD REPAYMENT'-'STD BALANCE') FOR 30.
 850 :
 851 :          DETERMINE USE OF LOSS CARRY FORWARDS
 852 :
 853 :  'PRE-TAX INCOME' = 'NET SALES'-'TOTAL MFG COST'-'GEN & ADMN COST'-'WF INSUR COST'-'DEBT SERVICING'+'DEPRECIATION'
 854 :  IF('PRE-TAX INCOME' LT 0.0) ('LOSS ADDITION' = -1.0*'PRE-TAX INCOME';'TAXABLE INCOME' = 0.0)   ELSE 'TAXABLE INCOME' = 'PRE-
TAX INCOME'
 855 :  'INV ALLOWANCE' = 0.03*'INVENTORY'
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856 :  IF('INV ALLOWANCE' GE 'TAXABLE INCOME') 'INV ALLOWANCE' = 'TAXABLE INCOME'
857 :  'TAXABLE INCOME' = 'TAXABLE INCOME'-'INV ALLOWANCE'
858    BYCOLUMN (1..30.)
859 :  'CUM LOSS' = 'CUM LOSS' LAG 1.+'LOSS ADDITION'
860 :  IF('CUM LOSS' LAG 5. GT 'CUM LOSS USE' LAG 1.) 'WRITEOFF' = 'CUM LOSS' LAG 5.-'CUM LOSS USE' LAG 1.
861 :  'LOSS AVAILABLE' = 'LOSS AVAILABLE' LAG 1.-'LOSS CARRY FWD' LAG 1.-'WRITEOFF'+'LOSS ADDITION'
862 :  IF('LOSS AVAILABLE' LT 'TAXABLE INCOME') 'LOSS CARRY FWD' = 'LOSS AVAILABLE'    ELSE 'LOSS CARRY FWD' = 'TAXABLE INCOME'
863 :  'CUM LOSS USE' = 'CUM LOSS USE' LAG 1. +'WRITEOFF'+'LOSS CARRY FWD'
864 :  'TAXABLE INCOME' = 'TAXABLE INCOME'-'LOSS CARRY FWD'
870 :
871 :        DETERMINE USE OF CAPITAL COST ALLOWANCE
872 :
873 :  'BLDG CCA' = ('BLDG POOL' LAG 1.+'BLDG COST')*0.1
874 :  'X' = 'MFG EQP COST';'Y' = 'X' LAG 1.;'Z' = 'Y' LAG 1.
875 :  'CD' = (0.25*'X')+(0.50*'Y')+(0.25*'Z');'D' = 'X'+'Y'+'Z';IF('D' EQ 0.0) 'C' = 0.0 ELSE 'C' = 'CD'/'D'
876 :  'MFG EQP CCA' = 'MFG EQP CCA POOL' LAG 1.+'CD'
877 :  'OTH EQP CCA' = ('OTH EQP POOL' LAG 1.+'OTH EQP COST')*0.2
878 :  'WD CAMP CCA' = ('WD CAMP POOL' LAG 1.+'WD CAMP COST')*0.3
879 :  'WD MOB EQP CCA' = ('WD MOB EQP POOL' LAG 1.+'WD MOB EQP COST')*0.3
880 :  'WD ROADS CCA' = ('WD WD3 EQP POOL' LAG 1.+'WD ROADS COST')*0.06
881 :  'CCA AVAILABLE' = 'WD CAMP CCA'+'WD MOB EQP CCA'+'WD ROADS CCA'+'BLDG CCA'+'MFG EQP CCA'+'OTH EQP CCA'
882 :  IF('CCA AVAILABLE' LT 'TAXABLE INCOME') 'CCA' = 'CCA AVAILABLE' ELSE 'CCA' = 'TAXABLE INCOME'
890 :
891 :        DETERMINE USE OF INVESTMENT TAX CREDITS
892 :
893 :  'FEDERAL TAX' = 0.315*('TAXABLE INCOME'-'CCA')
894 :  IF('FEDERAL TAX' GE 0.0 AND 'FEDERAL TAX' LE 15000.0) 'MAX ITC' = (0.315*('TAXABLE INCOME'-'CCA'))/(1.0-(0.315*'C')) ELSE 'M
AX ITC' = ((0.1575*('TAXABLE INCOME'-'CCA'))+15000.0)/(1.0-(0.1575*'C'))
895 :  'ITC ADDITION' = 0.5*'MFG EQP COST'
896 :  'CUM ITC' = 'CUM ITC' LAG 1.+'ITC ADDITION'
897 :  IF('CUM ITC' LAG 7. GT 'CUM ITC USE' LAG 1.) 'ITC LOST' = 'CUM ITC' LAG 7.-'CUM ITC USE' LAG 1.
898 :  'ITC AVAILABLE' = 'ITC AVAILABLE' LAG 1.-'ITC' LAG 1.-'ITC LOST'+'ITC ADDITION'
899 :  IF('MAX ITC' LE 0.0) 'MAX ITC' = 0.0
900 :  IF('ITC AVAILABLE' LT 'MAX ITC') 'MAX ITC' = 'ITC AVAILABLE'
901 :  IF('MAX ITC' GT 'TAXABLE INCOME') 'ITC' = 'TAXABLE INCOME' ELSE 'ITC' = 'MAX ITC'
902 :  'CUM ITC USE' = 'CUM ITC USE' LAG 1. +'ITC LOST'+'ITC'
910 :
911 :        RE-CALCULATE CAPITAL COST ALLOWANCE
912 :
913 :  IF('D' LT 'ITC' OR 'D' EQ 0.0)('X' = 0.0;'Y' = 0.0;'Z' = 0.0;'ITC ADJUSTMENT' = 'ITC'-'D')   ELSE ('X' = 'X'-(('X'/'D')*'ITC
');'Y' = 'Y'-(('Y'/'D')*'ITC');'Z' = 'Z'-(('Z'/'D')*'ITC'))
914 :  'CD' = (0.25*'X')+(0.50*'Y')+(0.25*'Z')
915 :  'MFG EQP CCA' = 'MFG EQP CCA POOL' LAG 1.+'CD'
916 :  'CCA AVAILABLE' = 'WD CAMP CCA'+'WD MOB EQP CCA'+'WD ROADS CCA' +'BLDG CCA'+'MFG EQP CCA'+'OTH EQP CCA'
917 :  IF('CCA AVAILABLE' LT 'TAXABLE INCOME') 'CCA' = 'CCA AVAILABLE' ELSE 'CCA' = 'TAXABLE INCOME'
918 :  'TAXABLE INCOME' = 'TAXABLE INCOME'+'ITC ADJUSTMENT'-'CCA'
919 :  'BLDG POOL' = 'BLDG POOL' LAG 1.+'BLDG COST'-(('BLDG CCA'/'CCA AVAILABLE')*'CCA')
920 :  'MFG EQP CCA POOL' = 'MFG EQP CCA'-(('MFG EQP CCA'/'CCA AVAILABLE')*'CCA')
921 :  'OTH EQP POOL' = 'OTH EQP POOL' LAG 1.+'OTH EQP COST'-(('OTH EQP CCA'/'CCA AVAILABLE')*'CCA')
922 :  'WD CAMP POOL' = 'WD CAMP POOL' LAG 1.+'WD CAMP COST'-(('WD CAMP CCA'/'CCA AVAILABLE')*'CCA')
923 :  'WD MOB EQP POOL' = 'WD MOB EQP POOL' LAG 1.+'WD MOB EQP COST'-(('WD MOB EQP CCA'/'CCA AVAILABLE')*'CCA')
924 :  'WD ROADS POOL' = 'WD ROADS POOL' LAG 1.+'WD ROADS COST'-(('WD ROADS CCA'/'CCA AVAILABLE')*'CCA')
925    CONTINUE
930 :
931 :        CASH FLOW
932 :
933 :  'GROSS TAX' = (0.315 +(0.15*'SENS FACTOR 2'))*'TAXABLE INCOME'
934 :  'NET TAX PAYABLE' = 'GROSS TAX'-'ITC'
935 :  'UP CASH FLOW' = 'PRE-TAX INCOME'-'NET TAX PAYABLE'
936 :  'NET CASH FLOW' = 'UP CASH FLOW'-'CASH REQUIRED'+'RESIDUAL VALUE'
940 :
```

```
941 ;         FINANCIAL INDICATORS
942 ;
943 ;  'RCP' = DCF('NET CASH FLO*')
944 ;  'NPV 10%' = 'NET CASH FLO*' NPVAT 10.0;'NPV 10%' = ('NPV 10%'/1000000.0) FOR 1.
945 ;  'NPV 15%' = 'NET CASH FLO*' NPVAT 15.0;'NPV 15%' = ('NPV 15%'/1000000.0) FOR 1.
946 ;  'DUMMY CASH FLO*' = ('NET CASH FLO*'-1.0) FOR 1.;'DUMMY CASH FLO*' = 'NET CASH FLO*' FOR 2. TO 30.
947 ;  'PAYBACK' = PAYBACK('DUMMY CASH FLO*');'PAYBACK' = ('PAYBACK'-'CONST END'+1.) FOR 1.
948 ;
949 ;         FINISH
950 ;
```

APPENDIX B

CAPITAL COSTS FOR PLANT, WHARF, AND WOODLANDS

PLANT CAPITAL

Cost components per Sandwell Management Consultants, Labrador Forest Industries Development - Phase I, Project Identification Study, 1979 (first quarter) summarized and adjusted by appropriate Statistics Canada indices as noted to 1982 (fourth quarter).

	($ Millions)		
	1979(1)		1982(4)
Newsprint Mill:			
Buildings & Structures	41.8	x 1.45(a) =	60.6
Manufacturing Equipment	58.9	x 1.57(b) =	92.5
Non Manufacturing Equipment	36.0	x 1.50(c) =	54.0
Subtotal:	136.7		207.1
Overhead, Engineering & Contingencies @ 25%	34.9		51.8
Subtotal:	171.6		258.9
Start-up	4.7	x $\frac{258.9}{171.6}$	7.1
	176.3	=	266.0

t

TMP Mill:			
Buildings & Structures	25.9 x 1.45(a) =		37.6
Manufacturing Equipment	31.9 x 1.57(b) =		50.1
Non Manufacturing Equipment	23.3 x 1.50(c) =		35.0
Subtotal:	81.1		122.7
Overhead, Engineering, & Contingencies @ 25%	20.3		30.7
	101.4		153.4
Start-up	2.6 x $\frac{153.4}{101.4}$ =		3.9
	104.0		157.3
Sawmill:			
Buildings & Structures	3.05 x 1.45(a) =		4.4
Manufacturing Equipment	3.00 x 1.41(d) =		4.2
Non-Manufacturing Equipment	2.35 x 1.42(e) =		3.3
Subtotal	8.40		11.9
Overhead, Engineering & Contingencies	included		included
Start-up	0.40 x $\frac{11.9}{8.4}$ =		.6
	8.80		12.5

Construction Price Statistics, publication 62-007, Statistics Canada

(a) Total Input Price Index, Non-Residential Construction (CANSIM I.D. # D 481601):

1978: 193.2

1982: 279.6

$$\frac{279.6}{193.2} = 1.45$$

(b) Specialized Pulp and Paper Machinery Price Index (CANSIM I.D. # D 639918):

1979(1): 220.7

1982(4): 346.2

$$\frac{346.2}{220.7} = 1.57$$

(c) Total Machinery and Equipment Purchasing Price Index, Paper and Allied Industries (CANSIM I.E. # D 639742):

1979(1): 211.4

1982(4): 318.1

$$\frac{318.1}{211.4} = 1.50$$

(d) Specialized Wood Products Machinery Price Index (CANSIM I.D. # D 639915):

1979(1): 200.1

1982(4): 282.0

$$\frac{282.0}{200.1} = 1.41$$

(e) Total Machinery and Equipment Purchasing Price Index, Wood Products (CANSIM I.D. # D 639736)

1979(1): 183.5

1982(4): 259.9

$$\frac{259.9}{183.5} = 1.42$$

Overhead, engineering, contingencies and start-up expense are allocated to three asset classes used in the model., i.e. buildings and structures, manufacturing equipment, and non-manufacturing equipment on a pro-rated basis. Thus,

($ Millions, 1982(4))

	Newsprint Mill	TMP Mill	Sawmill
Buildings & Structures	77.8	48.2	4.6
Manufacturing Equipment	118.8	64.2	4.4
Non-Manufacturing Equipment	69.4	44.9	3.5
Total:	266.0	157.3	12.5

These are further increased by 7% for 1983 in accordance with the recommendations of Fenco Newfoundland Limited - Lavalin in conjunction with capital cost estimates they prepared for the Anaconda aluminum smelter study.

($ Millions, 1983)

	Newsprint Mill	TMP Mill	Sawmill
Buildings & Structures	83.2	51.6	4.9
Manufacturing Equipment	127.1	68.7	4.7
Non-Manufacturing Equipment	74.3	48.0	3.7
Total:	284.6	168.3	13.3

WHARF CAPITAL

Estimate based on Wharf-Preliminary Study, Greenfield Aluminum Reduction Facility, North West Point, Labrador, Canada prepared by Fenco Newfoundland Limited - Lavalin, (for Anaconda Aluminum Company), 1982.

Alternative # 1:

($ Thousands, 1982)

	Aluminum	Pulp-Paper-Lumber
Mobilization, Demobilization	(included with mark up)	
Berth # 1	20,659.8	20,659.8
Berth # 2	54,362.5	-
Mooring Dolphins (2)	1,092.9	1,092.9
Access Bridge (Shore to Wharf)	1,102.6	1,102.6
Bridge Piers	1,704.4	1,704.4
Rockfill Causeway	239.1	239.1
Walkways to Dolphins	74.0	74.0
Walkways, Bent Supports	201.3	201.3
Subtotal (Construction)	79,436.6	25,074.1
Temporary Facilities	6,264.4 x 0.315(a)	1,977.4
Miscellaneous Items	75.0 x 0.5(b)	37.5
Fendering	700.0 x 0.5(b)	350.0
Subtotal:	86,476.0	27,439.0

($ Thousands, 1982)

	Aluminum	Pulp-Paper-Lumber
Engineering & Construction Management @ 7.5%	6,485.7	2,057.9
Subtotal:	92,961.7	29,496.9
Contingencies @ 10%	9,296.2	2,949.7
Total for 1982	102,257.9	32,446.6
Escalation for 1983 @ 7%		2,271.3
Total for 1983		34,717.9

(a) Proportionate to construction costs, i.e. 25074.1/79436.6 = 0.315.

(b) Approximately half the size, therefore, half the requirements for these items.

WOODLANDS CAPITAL ($ Thousands, 1983)

Estimates developed by the Newfoundland Department of Forest Resources and Lands.

Harvesting Equipment:			
Skidders:			
56 operating + 6 spares = 62	@ $58.0 ea.	=	3,596
Delimbers/Slashers:			
28 operating + 3 spares = 31	@ $160.0 ea.	=	4,960
Trucks:			
30 operating + 3 spares = 33	@ $80.00 ea.	=	2,640
Trailers:			
60 operating + 6 spares	@ $31.0 ea.	=	2,046
Bulldozers: 9 operating	@ $275.0 ea.	=	2,475
Graders: 3 operating	@ $114.0 ea.	=	342
Buses: 5 operating	@ $ 31.0 ea.	=	155
Transivan: 1 operating	@ $ 17.0 ea.	=	17
Pickups: 22 operating	@ $12.0 ea.	=	264
Total Mobile Equipment:		=	16,495
Load Aligners: 3 operating	= 3 @ $ 34.0 ea.	=	102
Total:			16,597

Camp & Structures:		
1 camp accommodating up to 226 loggers	=	1,000
Garage and Maintenance Equipment		695
Weigh Scales		107
Total		1,802
Roads & Bridges: (spread over 10 years)		
Bridge spanning Churchill River at Muskrat Falls	=	3,700
Main Access Roads and Minor Bridges		
= 208 km @ 63.0/km	=	13,104
Total		16,804
Total Woodlands	=	35,203

APPENDIX C

WOODLANDS OPERATING COSTS

WOODLANDS OPERATING COST INPUTS ($1983)

Estimates developed by the Newfoundland Department of Forest Resources and Lands.

Labour (based on 150 working days/year; 8 hrs/day; 22% fringe benefits included):

	Employees	Cost (000's)	Avg. Wage	+ 10% Northern Allowance
Maintenance	71	$1,143	$13.42	$14.76
Logging	203	3,074	12.62	13.88
Road Work	16	242	12.60	13.86
Cookhouse	11	155	11.74	12.92
Combined	301	$4,614	$12.77	$14.05

$$\text{Labour cost/m}^3 = \frac{\$4,614,000}{360,000\text{m}^3} = \$12.82$$

+ 10% northern allowance = $14.10

Salaries (30% fringe benefits included):

Full complement = 38 permanent staff + 8 seasonal staff (3 months)

= 40 equivalent

Total Salaries = $1,477,000

Average Salary = $36,925 + 10% northern allowance

= $40,620

Supplies, Parts and Services:

Replacement Parts (20% of init' l cost of harvesting equipment/year) = 0.2 x $16,597,000	= 3,319,000
Chainsaws (replaced yearly)	= 38,000
Camp Supplies & Services ($11/man/day; 226 men)	= 373,000
Total:	$3,730,000

Supplies, Parts, Services cost/m^3 = $\frac{\$3,730,000}{360,000m^3}$ = $\$10.36/m^3$

Fuel and Oil:

	Consumption (000's litre)	Price ($/litre)	Total Cost ($000's)
Marked Diesel	1,144	0.403	$461
Clear Diesel	1,086	0.467	507
Regular Gasoline	157	0.465	73
Marked Gasoline Mix	38	0.504	19
Oil and Lube	63	1.370	86
Combined:	2,488	0.461	$1,146

Fuel & Oil cost/m^3 = $\frac{\$1,146,000}{360,000m^3}$ = $\$3.18/m^3$

Forest Management:

Protection Services (fire & insect)	= $900,000
Forest Improvement	= 700,000
	$1,600,000

APPENDIX D

CTMP CHEMICALS USAGE AND COSTS

CTMP CHEMICALS USAGE ($1983/ADT Pulp)

Pulping (Chemical Pre-Treatment):		
Sodium Hydroxide	$ 5.00	
Sodium Sulphite	13.00	
Subtotal:	$18.00	= $18.00
Bleaching (moderate, i.e. from 58° to 72° Elrepho):		
Hydrogen Peroxide (1.2% on pulp)[1]	$ 9.00	
Hydrosulphite	6.00	
Other Chemicals		
Sodium Silicate		
Magnesium Sulphite		
Sulphur Dioxide		
Chelating Agent	$20.00	
Subtotal:	$45.00	= $45.00
Total CTMP Chemical Usage (moderate bleaching):		$63.00

1. Bleaching costs have been reduced by 7% to 10% in consideration of the above normal brightness of pulp produced from northern black spruce.

Bleaching (high, i.e. from 58° to 76°-78° Elrepho):		
Hydrogen Peroxide (1.6% on pulp)[2]	$26.00	
Hydrosulphite	6.00	
Other Chemicals (as listed above)	$20.00	
Subtotal	$52.00	
Incremental cost of higher bleaching	$7.00	= $7.00
Total CTMP Chemical Usage (high bleaching):		$70.00

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2. Hydrogen peroxide cost f.o.b. mill is estimated to be $1,600/tonne in bulk. At present, hydrogen peroxide is not produced commercially in Canada and would have to be imported from the U.S.

APPENDIX E

PRODUCT TRANSPORTATION AND HANDLING COSTS

SHIPPING, UNLOADING & DELIVERY COST

Based on consultations with Acres Consulting Services and information contained in The Lake Melville Winter Navigation Incremental Cost Study (Final Report), 1982, prepared by that company in association with Nordco Limited.

Parameters:

- 10,000 dwt side loading vessel suitable for pulp, paper, and lumber (storage density approximately 2.5 m^3/tonne) similar to the type used by Bowater Newfoundland Limited but with icebreaking capability.

- Yearly tonnage: approximately 150,000 tonnes.

- Travelling exclusively between North West Point and Rotterdam; distance: 2402 nm one way.

- Ship speed: 14.75 knots (average of loaded and unloaded speeds) less 7% delay for rough seas = 329nm/day.

- Icebreaking delay time: 0.5 days/voyage (average for a year)

- Port delays: 0.25 days at each end of voyage.

- Cargo handling rates: 250 tonnes/hr. loading and unloading; 20 hr./day (no weather delays as both operations are totally enclosed).

- 350 operating days/year.

Capital ($ millions):

- basis ship, i.e. 10,000 dwt side loading vessel, North European shipyard construction cost (1982-83)	= US	22.5
- convert at CDN$1.235/US$1.00	= CDN	27.8
- incremental cost for icebreaking capability (same as for 20,000 dwt bulk cargo vessel, i.e. 41.5% of basis ship cost)	=	11.5
Subtotal	=	39.3
- owners supervision & interest during construction (based on $40 million icebreaking vessel)	=	2.6
Total:		41.9

Typical financing terms currently available in North European shipyards are for 15 years at 10% per year. For the purposes of this analysis, however, the capital cost including financing charges should be spread out in equal annual amounts over the operating life of the project, i.e. 24 years beginning in 1989. This assumes that the useful life of the

ship is this long. Costs are assumed to increase at an average of 7% per year.

$41.9 million (FV^{7}_{4}) (CRF^{10}_{24}) = $6.11 m./yr.

where, (FV^{7}_{4}) is the future value factor for 4 years at 7% per year.

(CRF^{10}_{24}) is the capital recovery factor for 24 years at 10% per year.

This component is constant from 1989 on.

Voyage Time (days):

at sea: (2402 nm x 2)/(329nm/day)	= 14.6	
icebreaking delay time	.5	
Subtotal	15.1	= 15.1
in port (loading and unloading):		
(10,000 dwt/(250 tons/hr. x 20 hr./day)) x 2	= 4.0	
delays (2 x 0.25 days)	.5	
Subtotal	4.5	= 4.5
Total:		19.6

Voyages rqd/year: $\frac{(150{,}000 \text{ tonnes/yr})(1.103 \text{ dwt/tonne})}{10{,}000 \text{ dwt}} = 17$

Utilization rate: $\frac{19.6 \text{ days/voyage} \times 17 \text{ voyages/yr.}}{350 \text{ working days}} = 95\%$

Capital cost/voyage: $\frac{19.6 \text{ days/voyage} \times \$6.11 \text{ m./yr.}}{350 \text{ working days/yr.}} = \$342,160$

Capital cost/tonne: $\frac{\$342,160/\text{voyage}}{(10,000 \text{ dwt/voyage})(0.907 \text{ dwt/tonne})} = \$37.72$

Operating Costs ($1982 except as noted; same as for 20,000 dwt bulk cargo vessel)

- fixed operating costs, eg.
  crew, insurance, etc. = $2,187,000/yr
- fixed operating costs/voyage:

$$\frac{(19.6 \text{ days/voyage})(\$2,187,000 \text{m./yr.})}{350 \text{ working days/yr.}} = \$122,472$$

- variable operating costs including fuel per voyage:

$7133/day at sea x 15.1 days	= $107,708
$468/day in port x 4.5 days	= $2,106
incremental cost/voyage while icebreaking	= $6,387
	= $116,201
port dues and charges (mainly Rotterdam)	= $20,000
Subtotal:	= $136,201

- total operating costs ($1982) per voyage = $258,673
- increase in operating costs for 1983 at 7% in line with increase in GNP = $18,107
- total operating costs ($1983)/voyage $276,780

Operating cost/tonne:

$$\frac{\$276,780}{(10,000 \text{ dwt})(0.907 \text{ tonnes/dwt})} = \$30.52$$

Estimated unloading & delivery charges = 10.00/tonne

Total operating costs ($1983) = $40.52/tonne

The equivalent shipping cost in 1983 would be,

$(PV^{10}_{6})(\$37.72) + \$40.52 = \$61.81/\text{tonne}$

where, (PV^{10}) is the present value factor for 6 years at 10% per year.

The actual shipping cost in each year beginning in 1989, however, is comprised of a constant $37.72/tonne capital component and the current value of the operating component, $40.52/tonne. A compilation of actual rates assuming a rate of increase in the operating component in line with GNP is given in the following table.

PRODUCT SHIPPING UNLOADING AND DELIVERY COST
($ current/tonne)

Year	% Increase in Operating Component	Operating Component	Capital Component	Total
1983		40.52	n/a	n/a
1984	6.7	43.23	n/a	n/a
1985	6.8	46.17	n/a	n/a
1986	6.7	49.27	n/a	n/a
1987	6.3	52.37	n/a	n/a
1988	6.0	55.51	n/a	n/a
1989	5.8	58.73	37.72	96.45
1990	6.1	62.32	37.72	100.04
1991	5.8	65.93	37.72	103.65
1992	5.8	69.76	37.72	107.48
1993	5.9	73.87	37.72	111.59
1994	6.0	78.30	37.72	116.02
1995	5.8	82.85	37.72	120.57
1996	5.6	87.48	37.72	125.20
1997	5.8	92.56	37.72	130.28
1998	5.8	97.93	37.72	135.65
1999	6.1	103.90	37.72	141.62
2000	5.8	109.93	37.72	147.65
2001	5.7	116.19	37.72	153.91
2002	5.7	122.82	37.72	160.54
2003	5.7	129.82	37.72	167.54
2004	5.7	137.22	37.72	174.94
2005	5.7	145.04	37.72	182.76
2006	5.7	153.30	37.72	191.02
2007	5.7	162.04	37.72	199.76
2008	5.7	171.28	37.72	201.00
2009	5.7	181.04	37.72	218.76
2010	5.7	191.36	37.72	229.08
2011	5.7	202.27	37.72	239.99
2012	5.7	213.80	37.72	251.52

TRUCKING, TRANSFER & SHIP LOADING COST

Parameters:

- 10,000 dwt (9070 tonnes) required to be moved every 19.6 days to meet shipping schedules; 150,000 tonnes/yr.
- truck/trailer combinations of approximately 29 tonnes capacity; trucks used to deliver trailers but not to wait during loading and unloading.
- distance between Muskrat Falls and North West Point by road: approximately 65 km.
- average speed: 65 km/hr.
- drop off and pick up time: 10 mins x 2 = 20 mins.
- transfer time to and from trailers: 15 tonnes/hr./forklift
- ship loading rate: 250 tonnes/hr. (3 forklifts + crane)
- 3 x 8 hr. shifts/day; 7 working hrs./shift.

Equipment Requirements:

- travel time: (65 km/65 km/hr.) x 2 = 2.00 hrs.
- drop off and pick up time = 0.33 hrs.
- time required/load = 2.33 hrs.

$$\text{loads/shift} = \frac{7 \text{ hrs./shift}}{2.33 \text{ hrs./load}} = 3 \text{ or } 9 \text{ loads/day/truck}$$

$$\text{trucks required} = \frac{9070 \text{ tonnes}}{(19.6 \text{ days})(29 \text{ tonnes/load})(9 \text{ loads/day/truck}}$$

= 1.8 + 25% allowance for downtime = 2.2

thus, 2 trucks required + 1 spare

4 trailers required.

$$\text{forklifts required} = \frac{(2 \text{ trucks})(3 \text{ loads/shift})(29 \text{ tonnes/load})}{(7 \text{ hrs./shift})(15 \text{ tonnes/hr.})}$$

$$= 1.66 + 25\% \text{ allowance for downtime} = 2.07$$

3 forklifts + 1 spare are required for shiploading, however, and it is assumed that these can serve double duty.

Capital ($1983):

3 trucks at $80,000 ea.	= $240,000
4 trailers at $31,000 ea.	= 124,000
4 forklifts at $40,000 ea.	= 160,000
Total:	= $524,000

The initial expenditure would be incurred at the end of the construction period, i.e. 1989, but equivalent expenditures would be incurred every five years as the equipment is replaced. The total cost must be spread out in equal annual amounts over the operating life of the project, i.e. 24 years beginning in 1989. It is assumed that the rate of increase in costs averages 7% annually while the discount rate is 10%.

1989:	$(\$524,000)(FV^{7}_{6})(PV^{10}_{6})$	= $444,000
1994:	$(\$524,000)(FV^{7}_{11})(PV^{10}_{11})$	= $387,000
1999:	$(\$524,000)(FV^{7}_{16})(PV^{10}_{16})$	= $337,000
2004:	$(\$524,000)(FV^{7}_{21})(PV^{10}_{21})$	= $293,000
2009:	$(\$524,000)(FV^{7}_{26})(PV^{10}_{26})$	= $255,000

Total present value of future purchases $1,716,000

Equivalent annual value =

$(\$1,716,000)(FV^{10}_{6})(CRF^{10}_{24} = \$338,000/yr.$

where, FV^{7}_{6} is the future value factor for 6 years at 7%, etc.

PV^{10}_{6} is the present value factor for 6 years at 10%, etc.

CRF^{10}_{24} is the capital recovery factory for 24 years at 10%

$$\text{Capital cost/tonne} = \frac{\$338,000/yr.}{150,000 \text{ tonnes/yr.}} = \$2.25$$

This figure is constant from 1989 on.

Operating Costs ($1983):

- replacement parts: 20% of $240,000 + $160,000 = $80,000/yr.
- fuel & Oil: 600,0001/gr. at $0.461/1. = 277,000/yr.
- tonnage: = 100,000/yr.

Labour:

drivers:

$$\frac{(150,000 \text{ tonnes/yr})(8 \text{ hr./shift})}{(3 \text{ loads/shift})(29 \text{ tonnes/load})} = 13793 \text{ hrs./yr @ } 13.88/hr.$$

$= \$192,000/yr.$

forklift operators:

truck transfer - $\frac{150,000 \text{ tonnes/yr.}}{15 \text{ tonnes/hr.}} = 10,000$ hrs./yr.

ship loading - $\frac{150,000 \text{ tonnes/yr.}}{250 \text{ tonnes/hr.}} \times 3 = 1,800$ hrs./yr.

11,800 hrs./yr @ 13.88/hr. = $164,000/yr.

crane operator: 2080 hrs./yr. @ $13.88 hr. = $ 29,000/yr.

mechanics & helpers: 4 x 2080 hrs./yr x 14.76/hr.

= $ 123,000/yr.

Subtotal: $ 508,000/yr.

Total operating costs: = $ 965,000/yr.

Operating cost/tonne = $\frac{\$965,000}{150,000 \text{ tonnes}}$ = $6.43 tonne

The equivalent trucking, transfer and shiploading cost in 1983 would be:

$(PV^{10}_{6})(\$2.25) + \$6.43 = \$7.70/\text{tonne}$

The actual cost in each year beginning in 1989, however, is comprised of a constant $2.25/tonne capital component and the current value of the operating component, $6.43/tonne. A compilation of actual rates assuming a rate of increase in the operating component in line with the increase in GNP is given in the following table.

TRUCKING, TRANSFER & SHIP LOADING COST
($ current/tonne)

Year	% Increase in Operating Component	Operating Component	Capital Component	Total
1983		6.43	n/a	n/a
1984	6.7	6.86	n/a	n/a
1985	6.8	7.33	n/a	n/a
1986	6.7	7.82	n/a	n/a
1987	6.3	8.31	n/a	n/a
1988	6.0	8.81	n/a	n/a
1989	5.8	9.32	2.25	11.57
1990	6.1	9.89	2.25	12.14
1991	5.8	10.46	2.25	12.71
1992	5.8	11.07	2.25	13.32
1993	5.9	11.72	2.25	13.97
1994	6.0	12.43	2.25	14.68
1995	5.8	13.15	2.25	15.40
1996	5.6	13.88	2.25	16.13
1997	5.8	14.69	2.25	16.94
1998	5.8	15.54	2.25	17.79
1999	6.1	16.49	2.25	18.74
2000	5.8	17.44	2.25	19.69
2001	5.7	18.44	2.25	20.69
2002	5.7	19.49	2.25	21.74
2003	5.7	20.60	2.25	22.85
2004	5.7	21.77	2.25	24.02
2005	5.7	23.02	2.25	25.27
2006	5.7	24.33	2.25	26.58
2007	5.7	25.71	2.25	27.96
2008	5.7	27.18	2.25	29.43
2009	5.7	28.73	2.25	30.98
2010	5.7	30.37	2.25	32.62
2011	5.7	32.10	2.25	34.35
2012	5.7	33.93	2.25	36.18

APPENDIX F

NEWSPRINT BASE CASE COMPUTER PRINTOUT

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	0	0	0	0	0	0	265263	360000	360000	360000
COST ($/M3):										
LABOR	.00	.00	.00	.00	.00	.00	22.62	24.55	26.54	28.63
FUEL, OIL & LUBE	.00	.00	.00	.00	.00	.00	4.97	5.31	5.66	6.04
SUPPLIES & PARTS	.00	.00	.00	.00	.00	.00	15.03	15.96	16.94	17.94
STUMPAGE	.00	.00	.00	.00	.00	.00	2.26	2.40	2.54	2.69
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	44.89	48.22	51.67	55.29
OVERHEAD	.00	.00	.00	.00	.00	.00	59.81	39.71	38.71	40.28
TOTAL	.00	.00	.00	.00	.00	.00	104.70	87.94	90.39	95.57
PULP/PAPER										
PRODUCTION (MT)	0	0	0	0	0	0	109888	147776	147776	147776
COST ($/MT):										
WOOD	.00	.00	.00	.00	.00	.00	255.06	214.23	220.19	232.83
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	72.60	72.60	72.60	72.60
FUEL	.00	.00	.00	.00	.00	.00	7.19	7.69	8.19	8.73
LABOR	.00	.00	.00	.00	.00	.00	142.54	113.96	123.19	132.92
CHEMICALS	.00	.00	.00	.00	.00	.00	19.18	20.39	21.65	22.47
FINISHING SUPPLIES	.00	.00	.00	.00	.00	.00	13.06	13.87	14.71	15.58
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	20.31	21.57	22.89	24.24
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	529.94	464.30	485.32	509.38
OVERHEAD	.00	.00	.00	.00	.00	.00	240.12	180.71	184.52	188.54
TOTAL	.00	.00	.00	.00	.00	.00	770.06	645.01	667.85	697.92
PRICE ($/MT)	.00	.00	.00	.00	.00	.00	1065.76	1137.16	1213.35	1294.64
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

CASH REQUIREMENTS ($MILLIONS)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CAPITAL EXPENDITURES:										
WOODLANDS	.00	.00	.00	.00	.00	30.47	3.77	3.69	5.71	7.95
PULP/PAPER MILL	.00	.00	.00	49.16	230.55	96.20	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	18.28	21.36	4.87	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	67.44	251.92	131.54	3.77	3.69	5.71	7.95
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	67.44	251.92	131.54	3.77	3.69	5.71	7.95
WORKING CAPITAL:										
WOOD INV	.00	.00	.00	.00	.00	.00	3.05	4.21	4.52	4.84
RAW MATERIALS INV	.00	.00	.00	.00	.00	.00	.96	1.39	1.48	1.56
FINISHED GOODS INV	.00	.00	.00	.00	.00	.00	7.63	9.02	9.41	9.93
SPARE PARTS INV	.00	.00	.00	.00	.00	.00	6.19	6.58	6.98	7.39
RECEIVABLES	.00	.00	.00	.00	.00	.00	8.47	12.31	13.18	14.10
LESS:										
PAYABLES	.00	.00	.00	.00	.00	.00	2.54	3.01	3.14	3.31
TOTAL	.00	.00	.00	.00	.00	.00	23.77	30.50	32.42	34.51
ADDITIONS	.00	.00	.00	.00	.00	.00	23.77	6.73	1.92	2.09
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	23.77	6.73	1.92	2.09
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	23.77	6.73	1.92	2.09
TOTAL CASH REQUIREMENT	.00	.00	.00	67.44	251.92	131.54	27.54	10.43	7.63	10.04
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	.00	.00	.00	.00	.00	.00	10.35	11.15	11.34	11.43

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

CASH FLOW ($MILLIONS)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GROSS SALES REVENUE	.00	.00	.00	.00	.00	.00	116.05	168.05	179.30	191.32
LESS:										
SELLING COST	.00	.00	.00	.00	.00	.00	1.16	1.68	1.79	1.91
DISTRIBUTION COST	.00	.00	.00	.00	.00	.00	11.78	16.58	17.20	17.85
NET SALES REVENUE	.00	.00	.00	.00	.00	.00	103.11	149.79	160.32	171.55
LESS:										
MANUFACTURING COSTS	.00	.00	.00	.00	.00	.00	83.85	95.32	98.69	103.14
GENERAL & ADMIN COSTS	.00	.00	.00	.00	.00	.00	2.17	2.31	2.44	2.58
INSURANCE (WHARF)	.00	.00	.00	.00	.00	.00	.25	.27	.28	.30
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	.00	.00	.00	.00	.00	.00	29.07	27.09	26.32	26.45
PRE-TAX INCOME	.00	.00	.00	.00	.00	.00	45.90	78.99	85.22	91.98
LESS:										
INVENTORY ALLOWANCE	.00	.00	.00	.00	.00	.00	.54	.64	.67	.71
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	.00	.00	.00	.00	.00	.00	45.36	78.35	84.55	57.22
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	5.38
TAXABLE INCOME	.00	.00	.00	.00	.00	.00	.00	.00	.00	39.43
GROSS TAX	.00	.00	.00	.00	.00	.00	.00	.00	.00	18.73
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	5.38
NET TAX PAYABLE	.00	.00	.00	.00	.00	.00	.00	.00	.00	13.35
OPERATING CASH FLOW	.00	.00	.00	.00	.00	.00	45.90	78.99	85.22	78.63
LESS:										
CASH REQUIRED	.00	.00	.00	67.44	231.92	131.54	27.54	10.43	7.63	10.04
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	.00	.00	.00	(67.44)	(231.92)	(131.54)	18.36	68.56	77.59	68.59

RATE OF RETURN IS 13.5 %
NET PRESENT VALUE AT 10% IS 135.4 $MILLION
NET PRESENT VALUE AT 15% IS -30.4 $MILLION
PAYBACK PERIOD IS 7.5 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	30.89	33.40	36.00	38.81	41.88	45.14	48.66	52.36	56.24	60.62
FUEL, OIL & LUBE	6.43	6.86	7.31	7.80	8.31	8.86	9.44	10.07	10.73	11.44
SUPPLIES & PARTS	19.19	20.59	21.85	23.23	24.85	26.52	28.19	29.91	31.73	33.67
STUMPAGE	2.86	3.01	3.19	3.37	3.56	3.78	4.00	4.23	4.47	4.72
TOTAL DIRECT COST	59.37	63.86	68.35	73.20	78.60	84.30	90.29	96.56	103.27	110.45
OVERHEAD	44.02	48.69	50.41	49.16	52.23	54.51	56.31	58.70	61.62	64.84
TOTAL	103.38	112.56	118.77	122.36	131.83	138.81	146.60	155.26	164.89	175.29
PULP/PAPER										
PRODUCTION (MT)	147776	147776	147776	147776	147776	147776	147776	147776	147776	147776
COST ($/MT):										
WOOD	251.85	274.20	299.33	298.08	321.15	338.16	357.14	378.24	401.69	427.03
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60
FUEL	9.31	9.92	10.58	11.28	12.02	12.82	13.66	14.56	15.52	16.55
LABOR	143.42	155.04	167.13	180.17	194.40	209.57	225.91	243.08	261.56	281.44
CHEMICALS	24.38	25.82	26.44	27.92	29.54	31.73	33.73	36.09	38.62	41.32
FINISHING SUPPLIES	16.67	17.89	18.74	20.16	21.59	23.04	24.49	25.98	27.56	29.25
OPER & MAIN SUPPLIES	25.93	27.83	29.83	31.39	33.58	35.83	38.09	40.41	42.88	45.49
TOTAL DIRECT COST	544.18	583.31	614.59	641.61	684.89	723.74	765.62	810.97	860.43	913.68
OVERHEAD	192.89	197.65	203.57	207.73	213.48	219.64	226.13	232.93	240.21	248.00
TOTAL	737.07	780.96	817.16	849.34	898.37	943.38	991.75	1043.90	1100.64	1161.67
PRICE ($/MT)	1331.34	1473.94	1572.69	1673.05	1790.49	1910.46	2038.46	2175.03	2320.76	2476.25
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
WORKING CAPITAL:										
WOOD INV	5.20	5.60	6.00	6.43	6.91	7.42	7.96	8.52	9.12	9.76
RAW MATERIALS INV	1.64	1.79	1.93	2.00	2.13	2.28	2.42	2.58	2.75	2.92
FINISHED GOODS INV	10.62	11.39	12.21	12.97	13.45	14.21	15.05	15.96	16.96	18.02
SPARE PARTS INV	7.41	8.49	9.30	9.57	10.24	10.93	11.61	12.32	13.07	13.87
RECEIVABLES	15.09	16.14	17.26	18.46	19.74	21.11	22.56	24.12	25.79	27.56
LESS:										
PAYABLES	3.54	3.80	4.09	4.39	4.45	4.74	5.02	5.32	5.65	6.01
TOTAL	36.42	39.60	42.13	44.84	47.93	51.20	54.59	58.19	62.03	66.14
ADDITIONS	2.43	2.65	2.56	2.69	3.13	3.23	3.39	3.59	3.85	4.11
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	2.43	2.65	2.56	2.69	3.13	3.23	3.39	3.59	3.85	4.11
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	2.43	2.65	2.56	2.69	3.13	3.23	3.39	3.59	3.85	4.11
TOTAL CASH REQUIREMENT	10.92	11.72	12.17	12.89	14.02	11.67	12.37	13.12	13.95	14.83
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	11.44	11.43	11.53	11.70	11.72	11.81	11.88	11.93	11.97	12.01

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

CASH FLOW ($MILLIONS)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GROSS SALES REVENUE	204.14	217.81	232.41	247.98	264.59	282.32	301.24	321.42	342.95	365.93
LESS:										
SELLING COST	2.04	2.18	2.32	2.48	2.65	2.82	3.01	3.21	3.43	3.66
DISTRIBUTION COST	19.55	19.31	20.09	20.89	21.76	22.67	23.70	24.73	25.80	26.94
NET SALES REVENUE	183.54	196.32	209.99	224.61	240.19	256.82	274.53	293.47	313.72	335.33
LESS:										
MANUFACTURING COSTS	108.92	115.41	120.76	125.52	132.76	139.41	146.56	154.26	162.65	171.67
GENERAL & ADMIN COSTS	2.73	2.90	3.07	3.24	3.43	3.64	3.85	4.07	4.30	4.54
INSURANCE (SHARE)	.32	.34	.35	.37	.40	.42	.44	.47	.50	.53
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	27.31	28.47	28.55	27.53	28.37	28.16	28.10	28.23	28.49	28.81
PRE-TAX INCOME	98.28	106.15	114.36	123.01	131.98	141.52	151.78	162.90	174.77	187.41
LESS:										
INVENTORY ALLOWANCE	.76	.82	.87	.92	.98	1.04	1.11	1.18	1.26	1.34
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	32.36	28.58	25.61	23.29	21.51	19.91	18.89	18.15	17.66	17.36
PLUS:										
TAX CREDIT ADJUSTMENT	10.37	12.10	(.00)	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	75.13	88.85	87.88	98.81	109.49	120.57	131.78	143.57	155.86	168.71
GROSS TAX	36.16	42.20	41.75	46.93	52.01	57.27	62.60	68.20	74.03	80.14
LESS:										
INVESTMENT TAX CREDIT	10.37	12.10	(.00)	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	25.79	30.10	41.75	46.93	52.01	57.27	62.60	68.20	74.03	80.14
OPERATING CASH FLOW	73.09	76.05	72.62	76.08	79.97	84.25	89.19	94.71	100.74	107.27
LESS:										
CASH REQUIRED	10.92	11.72	12.17	12.89	14.02	11.67	12.37	13.12	13.95	14.83
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	62.17	64.32	60.45	63.19	65.95	72.58	76.82	81.59	86.79	92.44

RATE OF RETURN IS 13.5 %
NET PRESENT VALUE AT 10% IS 125.4 $MILLION
NET PRESENT VALUE AT 15% IS -30.6 $MILLION
PAYBACK PERIOD IS 7.5 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	65.23	70.19	75.52	81.26	87.44	94.08	101.23	108.93	117.20	126.11
FUEL, OIL & LUBE	12.20	13.00	13.86	14.77	15.75	16.79	17.90	19.08	20.34	21.68
SUPPLIES & PARTS	35.72	37.90	40.21	42.66	45.27	48.03	50.96	54.06	57.36	60.86
STUMPAGE	4.99	5.28	5.58	5.90	6.23	6.59	6.96	7.36	7.78	8.22
TOTAL DIRECT COST	118.14	126.36	135.17	144.59	154.68	165.48	177.05	189.43	202.68	216.87
OVERHEAD	68.27	72.18	76.86	81.85	87.16	92.83	98.87	105.31	112.17	119.49
TOTAL	186.41	198.54	212.03	226.44	241.85	258.31	275.92	294.73	314.85	336.36
PULP/PAPER										
PRODUCTION (MT)	147776	147776	147776	147776	147776	147776	147776	147776	147776	147776
COST ($/MT):										
WOOD	464.11	483.67	516.53	551.64	589.17	629.28	672.16	718.00	767.01	819.41
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60	72.60
FUEL	17.64	18.81	20.08	21.37	22.78	24.28	25.89	27.59	29.42	31.36
LABOR	302.83	325.84	350.60	377.25	405.92	436.77	469.96	505.68	544.11	585.47
CHEMICALS	44.21	47.31	50.62	54.16	57.95	62.01	66.35	70.99	75.96	81.28
FINISHING SUPPLIES	31.03	32.92	34.93	37.06	39.32	41.72	44.27	46.97	49.83	52.87
OPER & MAIN SUPPLIES	48.27	51.21	54.34	57.65	61.17	64.90	68.86	73.06	77.52	82.25
TOTAL DIRECT COST	970.69	1032.36	1099.66	1171.73	1248.91	1331.57	1420.09	1514.90	1616.46	1725.23
OVERHEAD	256.33	265.25	274.79	285.01	295.95	307.66	193.00	206.42	220.79	236.18
TOTAL	1227.02	1297.61	1374.46	1456.74	1544.86	1639.22	1613.09	1721.33	1837.25	1961.41
PRICE ($/MT)	2042.16	2819.19	3008.37	3209.61	3424.66	3654.11	3898.93	4160.16	4438.89	4736.30
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

CASH REQUIREMENTS ($MILLIONS)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CAPITAL EXPENDITURES:										
WOODLANDS	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
WORKING CAPITAL:										
WOOD INV	10.45	11.19	11.98	12.83	13.74	14.72	15.76	16.88	18.06	19.37
RAW MATERIALS INV	3.11	3.31	3.53	3.76	4.00	4.26	4.54	4.83	5.14	5.48
FINISHED GOODS INV	19.17	20.40	21.75	23.19	24.74	26.40	28.17	30.07	32.11	34.30
SPARE PARTS INV	14.72	15.62	16.57	17.58	18.65	19.79	21.00	22.28	23.64	25.08
RECEIVABLES	29.46	31.48	33.64	35.95	38.41	41.04	43.85	46.85	50.04	53.46
LESS:										
PAYABLES	6.39	6.80	7.25	7.73	8.25	8.80	9.39	10.02	10.70	11.43
TOTAL	70.52	75.21	80.23	85.58	91.30	97.41	103.93	110.89	118.31	126.25
ADDITIONS	4.38	4.69	5.02	5.36	5.72	6.11	6.52	6.96	7.43	7.93
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	4.38	4.69	5.02	5.36	5.72	6.11	6.52	6.96	7.43	7.93
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	4.38	4.69	5.02	5.36	5.72	6.11	6.52	6.96	7.43	7.93
TOTAL CASH REQUIREMENT	15.76	16.76	17.83	18.95	20.14	21.40	22.75	24.18	25.70	27.32
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	12.04	12.06	12.07	12.07	12.07	12.07	12.07	12.06	12.05	12.04

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CASH FLOW ($MILLIONS)										
GROSS SALES REVENUE	390.45	416.61	444.52	474.30	506.06	539.99	576.17	614.77	655.96	699.91
LESS:										
SELLING COST	3.90	4.17	4.45	4.74	5.06	5.40	5.76	6.15	6.56	7.00
DISTRIBUTION COST	28.14	29.40	30.74	32.16	33.65	35.23	36.91	38.67	40.54	42.52
NET SALES REVENUE	358.41	383.04	409.33	437.40	467.37	499.36	533.50	569.95	608.86	650.40
LESS:										
MANUFACTURING COSTS	181.32	191.75	203.11	215.27	228.29	242.24	238.38	254.37	271.50	289.85
GENERAL & ADMIN COSTS	4.80	5.07	5.36	5.67	5.99	6.33	6.70	7.08	7.48	7.91
INSURANCE (@MARF)	.56	.59	.62	.66	.69	.73	.77	.82	.87	.91
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	29.15	29.60	30.26	30.95	31.70	32.48	14.52	15.41	16.35	17.35
PRE-TAX INCOME	200.89	215.22	230.49	246.76	264.09	282.53	302.18	323.09	345.36	369.07
LESS:										
INVENTORY ALLOWANCE	1.42	1.52	1.61	1.72	1.83	1.95	2.08	2.22	2.37	2.53
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	17.25	17.29	17.47	17.77	18.20	18.73	19.37	20.11	20.94	21.88
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	182.21	196.42	211.41	227.27	244.06	261.85	280.73	300.77	322.05	344.67
GROSS TAX	85.65	93.30	100.42	107.95	115.93	124.38	133.34	142.86	152.97	163.72
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	85.65	93.30	100.42	107.95	115.93	124.38	133.34	142.86	152.97	163.72
OPERATING CASH FLOW	114.33	121.92	130.07	138.81	148.16	158.16	168.83	180.23	192.39	205.35
LESS:										
CASH REQUIRED	15.76	16.76	17.83	18.96	20.14	21.40	22.75	24.18	25.70	27.32
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	126.25
NET CASH FLOW	98.57	105.16	112.24	119.86	128.02	136.75	146.08	156.05	166.69	304.28

RATE OF RETURN IS 13.5 %
NET PRESENT VALUE AT 10% IS 125.4 $MILLION
NET PRESENT VALUE AT 13% IS -30.6 $MILLION
PAYBACK PERIOD IS 7.5 YEARS AFTER START-UP

APPENDIX G

NEWSPRINT AND LUMBER BASE CASE

COMPUTER PRINTOUT

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	0	0	0	0	0	0	257305	360000	360000	360000
COST ($/M3):										
LABOR	.00	.00	.00	.00	.00	.00	22.62	24.55	26.54	28.63
FUEL, OIL & LUBE	.00	.00	.00	.00	.00	.00	4.97	5.31	5.66	6.04
SUPPLIES & PARTS	.00	.00	.00	.00	.00	.00	15.03	15.96	16.94	17.94
STUMPAGE	.00	.00	.00	.00	.00	.00	2.26	2.40	2.54	2.69
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	44.89	48.22	51.67	55.29
OVERHEAD	.00	.00	.00	.00	.00	.00	61.66	39.71	38.71	40.28
TOTAL	.00	.00	.00	.00	.00	.00	106.55	87.94	90.39	95.57
PULP/PAPER										
PRODUCTION (MT)	0	0	0	0	0	0	85368	120290	120290	120290
COST ($/MT):										
WOOD	.00	.00	.00	.00	.00	.00	259.57	214.23	220.19	232.83
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	89.10	89.10	89.10	89.10
FUEL	.00	.00	.00	.00	.00	.00	7.15	7.69	8.19	8.73
LABOR	.00	.00	.00	.00	.00	.00	181.82	140.00	151.34	163.30
CHEMICALS	.00	.00	.00	.00	.00	.00	19.18	20.39	21.55	22.47
FINISHING SUPPLIES	.00	.00	.00	.00	.00	.00	13.06	13.87	14.71	15.58
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	20.31	21.57	22.89	24.24
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	590.22	506.84	527.97	556.25
OVERHEAD	.00	.00	.00	.00	.00	.00	306.09	221.86	226.53	231.46
TOTAL	.00	.00	.00	.00	.00	.00	896.31	728.70	754.51	787.72
PRICE ($/MT)	.00	.00	.00	.00	.00	.00	1065.76	1137.16	1213.35	1294.84
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	38198	51840	51840	51840
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	137.63	113.59	116.75	123.45
ELECTRICITY	.00	.00	.00	.00	.00	.00	2.70	2.70	2.70	2.70
FUEL	.00	.00	.00	.00	.00	.00	14.38	15.37	16.39	17.47
LABOR	.00	.00	.00	.00	.00	.00	61.23	49.43	53.44	57.66
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	4.35	4.62	4.90	5.19
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	220.89	185.71	194.18	206.47
OVERHEAD	.00	.00	.00	.00	.00	.00	46.84	35.88	37.25	38.70
TOTAL	.00	.00	.00	.00	.00	.00	267.73	221.59	231.43	245.17
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	286.93	252.70	269.63	287.70

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	.00	.00	.00	.00	.00	30.47	3.77	3.69	5.71	7.95
PULP/PAPER MILL	.00	.00	.00	49.16	230.55	96.20	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	18.65	.00	.00	.00	.00
WHARF	.00	.00	.00	18.28	21.38	4.87	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	67.44	251.92	150.19	3.77	3.69	5.71	7.95
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	67.44	251.92	150.19	3.77	3.69	5.71	7.95
WORKING CAPITAL:										
WOOD INV	.00	.00	.00	.00	.00	.00	2.98	4.21	4.53	4.84
RAW MATERIALS INV	.00	.00	.00	.00	.00	.00	.87	1.31	1.39	1.47
FINISHED GOODS INV	.00	.00	.00	.00	.00	.00	7.85	9.35	9.77	10.33
SPARE PARTS INV	.00	.00	.00	.00	.00	.00	6.48	6.89	7.31	7.74
RECEIVABLES	.00	.00	.00	.00	.00	.00	7.24	10.90	11.66	12.49
LESS:										
PAYABLES	.00	.00	.00	.00	.00	.00	2.62	3.12	3.26	3.44
TOTAL	.00	.00	.00	.00	.00	.00	22.81	29.53	31.39	33.41
ADDITIONS	.00	.00	.00	.00	.00	.00	22.81	6.72	1.86	2.02
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	22.81	6.72	1.86	2.02
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	22.81	6.72	1.86	2.02
TOTAL CASH REQUIREMENT	.00	.00	.00	67.44	251.92	150.19	26.58	10.41	7.57	9.97
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	.00	.00	.00	.00	.00	.00	9.72	10.47	10.63	10.71

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

CASH FLOW ($MILLIONS)	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
GROSS SALES REVENUE	.00	.00	.00	.00	.00	.00	100.03	149.89	159.93	170.65
LESS:										
SELLING COST	.00	.00	.00	.00	.00	.00	1.00	1.50	1.60	1.71
DISTRIBUTION COST	.00	.00	.00	.00	.00	.00	10.89	15.82	16.41	17.04
NET SALES REVENUE	.00	.00	.00	.00	.00	.00	88.14	132.57	141.92	151.90
LESS:										
MANUFACTURING COSTS	.00	.00	.00	.00	.00	.00	86.74	99.14	102.76	107.46
GENERAL & ADMIN COSTS	.00	.00	.00	.00	.00	.00	2.17	2.31	2.44	2.58
INSURANCE (#HARF)	.00	.00	.00	.00	.00	.00	.25	.27	.28	.30
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	.00	.00	.00	.00	.00	.00	30.00	28.03	27.25	27.38
PRE-TAX INCOME	.00	.00	.00	.00	.00	.00	28.97	58.66	63.69	68.94
LESS:										
INVENTORY ALLOWANCE	.00	.00	.00	.00	.00	.00	.55	.65	.69	.73
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	.00	.00	.00	.00	.00	.00	28.42	58.23	63.00	68.21
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GROSS TAX	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPERATING CASH FLOW	.00	.00	.00	.00	.00	.00	28.97	58.88	63.69	68.94
LESS:										
CASH REQUIRED	.00	.00	.00	67.44	251.92	150.19	26.58	10.41	7.57	9.97
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	.00	.00	.00	(67.44)	(251.92)	(150.19)	2.39	48.47	56.12	58.96

RATE OF RETURN IS 10.3 %
NET PRESENT VALUE AT 10% IS 10.1 $MILLION
NET PRESENT VALUE AT 15% IS -94.9 $MILLION
PAYBACK PERIOD IS 9.8 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	30.89	33.40	36.00	38.81	41.88	45.14	48.66	52.36	56.34	60.62
FUEL, OIL & LUBE	6.44	6.36	7.31	7.80	8.31	8.85	9.44	10.07	10.73	11.44
SUPPLIES & PARTS	19.19	20.59	21.85	23.23	24.85	26.52	28.19	29.91	31.73	33.67
STUMPAGE	2.83	3.01	3.19	3.37	3.56	3.78	4.00	4.23	4.47	4.72
TOTAL DIRECT COST	59.37	63.86	68.35	73.20	78.60	84.30	90.29	96.56	103.27	110.45
OVERHEAD	44.02	48.69	50.41	49.16	53.23	54.51	56.31	58.70	61.62	64.84
TOTAL	103.38	112.56	118.77	122.36	131.83	138.81	146.60	155.26	164.89	175.29
PULP/PAPER										
PRODUCTION (MT)	120290	120290	120290	120290	120290	120290	120290	120290	120290	120290
COST ($/MT):										
WOOD	251.45	274.20	289.33	298.08	321.15	338.16	357.14	378.24	401.69	427.03
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10
FUEL	9.31	9.92	10.56	11.26	12.02	12.82	13.66	14.56	15.52	16.55
LABOR	176.20	190.47	205.32	221.34	238.63	257.45	277.54	298.63	321.32	345.74
CHEMICALS	24.39	25.82	26.44	27.92	29.54	31.73	33.73	36.09	38.62	41.32
FINISHING SUPPLIES	16.67	17.89	18.98	20.18	21.59	23.04	24.49	25.98	27.56	29.25
OPER & MAIN SUPPLIES	25.93	27.83	29.53	31.39	33.58	35.83	38.09	40.41	42.88	45.49
TOTAL DIRECT COST	593.45	635.24	669.28	699.28	745.81	788.13	833.74	883.02	936.70	994.49
OVERHEAD	236.79	242.63	248.06	255.05	262.04	269.59	277.55	285.69	294.81	304.36
TOTAL	830.24	877.86	917.94	954.33	1007.86	1057.72	1111.30	1168.91	1231.51	1298.85
PRICE ($/MT)	1381.39	1473.94	1572.69	1678.06	1790.49	1910.46	2038.46	2175.03	2320.76	2476.25
LUMBER										
PRODUCTION (M3)	51840	51840	51840	51840	51840	51840	51840	51840	51840	51840
COST ($/M3):										
WOOD	133.54	145.39	158.41	158.05	170.23	179.30	189.36	200.55	212.98	226.42
ELECTRICITY	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
FUEL	18.62	19.85	21.16	22.56	24.04	25.63	27.32	29.13	31.05	33.10
LABOR	62.22	67.26	72.50	78.16	84.33	90.91	98.00	105.45	113.46	122.08
OPER & MAIN SUPPLIES	5.56	5.96	6.32	6.73	7.20	7.68	8.16	8.66	9.19	9.75
TOTAL DIRECT COST	222.63	241.16	256.09	268.18	288.55	306.21	325.55	346.48	369.38	394.05
OVERHEAD	40.26	41.99	43.78	45.59	47.79	50.03	52.43	54.94	57.64	60.54
TOTAL	262.89	283.14	299.87	313.88	336.34	356.24	377.97	401.42	427.02	454.59
PRICE ($/M3)	305.47	327.54	349.49	372.90	397.89	424.55	452.99	483.34	515.72	550.28

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CASH REQUIREMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
WORKING CAPITAL:										
WOOD INV	5.23	5.60	6.00	6.43	6.91	7.42	7.96	8.52	9.12	9.76
RAW MATERIALS INV	1.57	1.68	1.77	1.88	2.00	2.14	2.28	2.42	2.58	2.75
FINISHED GOODS INV	11.04	11.85	12.52	13.11	14.01	14.84	15.73	16.70	17.74	16.87
SPARE PARTS INV	8.28	8.68	9.42	10.02	10.72	11.44	12.16	12.90	13.69	14.52
RECEIVABLES	13.35	14.29	15.29	16.36	17.50	18.71	20.00	21.39	22.87	24.45
LESS:										
PAYABLES	3.68	3.95	4.17	4.37	4.67	4.95	5.24	5.57	5.91	6.29
TOTAL	35.77	36.35	40.33	43.43	46.47	49.60	52.88	56.36	60.08	64.06
ADDITIONS	2.36	2.58	2.48	2.60	3.04	3.13	3.28	3.48	3.72	3.98
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	2.36	2.58	2.48	2.60	3.04	3.13	3.28	3.48	3.72	3.98
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	2.36	2.58	2.48	2.60	3.04	3.13	3.28	3.48	3.72	3.98
TOTAL CASH REQUIREMENT	10.84	11.65	12.10	12.81	13.93	11.57	12.26	13.00	13.83	14.70
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	10.72	10.71	10.79	10.94	10.95	11.03	11.08	11.13	11.16	11.18

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

CASH FLOW ($MILLIONS)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GROSS SALES REVENUE	182.06	194.28	207.30	221.19	236.00	251.82	268.69	286.69	305.90	326.39
LESS:										
SELLING COST	1.82	1.94	2.07	2.21	2.36	2.52	2.69	2.87	3.06	3.26
DISTRIBUTION COST	17.71	18.43	19.18	19.93	20.76	21.64	22.61	23.60	24.62	25.71
NET SALES REVENUE	162.55	173.90	186.05	199.04	212.88	227.66	243.39	260.22	278.22	297.42
LESS:										
MANUFACTURING COSTS	113.52	120.28	125.96	131.07	138.67	145.70	153.27	161.42	170.28	179.80
GENERAL & ADMIN COSTS	2.73	2.90	3.07	3.24	3.43	3.64	3.85	4.07	4.30	4.54
INSURANCE (WHARF)	.32	.34	.35	.37	.40	.42	.44	.47	.50	.53
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	28.25	29.40	29.49	29.47	29.31	29.10	29.04	29.16	29.43	29.74
PRE-TAX INCOME	74.25	79.80	86.15	92.83	99.70	107.00	114.86	123.43	132.57	142.30
LESS:										
INVENTORY ALLOWANCE	.78	.84	.89	.94	1.01	1.08	1.14	1.22	1.29	1.38
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	63.12	34.60	30.43	27.16	24.67	22.51	21.04	19.94	19.16	18.63
PLUS:										
TAX CREDIT ADJUSTMENT	1.64	7.00	(.00)	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	11.99	51.36	54.83	64.70	74.01	83.42	92.68	102.27	112.12	122.29
GROSS TAX	5.70	24.40	26.04	30.73	35.16	39.62	44.02	48.58	53.26	58.09
LESS:										
INVESTMENT TAX CREDIT	1.64	7.00	(.00)	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	4.05	17.40	26.04	30.73	35.16	39.62	44.02	48.58	53.26	58.09
OPERATING CASH FLOW	70.20	62.40	60.11	62.09	64.54	67.38	70.84	74.85	79.31	84.21
LESS:										
CASH REQUIRED	10.84	11.65	12.10	12.81	13.93	11.57	12.26	13.00	13.83	14.70
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	59.35	50.75	48.01	49.29	50.61	55.80	58.58	61.85	65.48	69.51

RATE OF RETURN IS 10.3 %
NET PRESENT VALUE AT 10% IS 10.1 $MILLION
NET PRESENT VALUE AT 15% IS -94.9 $MILLION
PAYBACK PERIOD IS 9.3 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	65.23	70.19	75.52	81.26	87.44	94.08	101.23	108.93	117.20	126.11
FUEL, OIL & LUBE	12.20	13.00	13.86	14.77	15.75	16.79	17.90	19.08	20.34	21.68
SUPPLIES & PARTS	35.72	37.90	40.21	42.66	45.27	48.03	50.96	54.06	57.36	60.86
STUMPAGE	4.99	5.28	5.58	5.90	6.23	6.59	6.96	7.36	7.78	8.22
TOTAL DIRECT COST	118.14	126.36	135.17	144.59	154.68	165.48	177.05	189.43	202.68	216.87
OVERHEAD	68.27	72.18	76.86	81.85	87.16	92.83	98.87	105.31	112.17	119.49
TOTAL	186.41	198.54	212.03	226.44	241.85	258.31	275.92	294.73	314.85	336.36
PULP/PAPER										
PRODUCTION (MT)	120290	120290	120290	120290	120290	120290	120290	120290	120290	120290
COST ($/MT):										
WOOD	454.11	483.67	516.53	551.64	589.17	629.28	672.16	718.00	767.01	819.41
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10	89.10
FUEL	17.64	18.81	20.05	21.37	22.79	24.28	25.89	27.59	29.42	31.36
LABOR	372.02	400.29	430.72	463.45	498.67	536.57	577.35	621.23	668.44	719.25
CHEMICALS	44.31	47.31	50.52	54.16	57.95	62.01	66.35	70.99	75.96	81.28
FINISHING SUPPLIES	31.03	32.92	34.93	37.06	39.32	41.72	44.27	46.97	49.83	52.87
OPER & MAIN SUPPLIES	48.27	51.21	54.34	57.65	61.17	64.90	68.86	73.06	77.52	82.25
TOTAL DIRECT COST	1056.39	1123.31	1196.28	1274.44	1358.17	1447.87	1543.98	1646.95	1757.29	1875.51
OVERHEAD	314.54	325.52	337.22	349.73	363.16	377.52	236.64	253.10	270.72	289.56
TOTAL	1370.97	1448.83	1533.50	1624.19	1721.33	1825.39	1780.62	1900.05	2028.00	2165.10
PRICE ($/MT)	2642.16	2819.19	3008.07	3209.61	3424.66	3654.11	3898.93	4160.16	4438.29	4736.30
LUMBER										
PRODUCTION (M3)	51840	51840	51840	51840	51840	51840	51840	51840	51840	51840
COST ($/M3):										
WOOD	240.78	256.45	273.87	292.49	312.38	333.65	356.39	380.70	406.68	434.46
ELECTRICITY	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
FUEL	35.23	37.61	40.09	42.74	45.56	48.57	51.77	55.19	58.83	62.72
LABOR	131.36	141.35	152.09	163.65	176.06	189.47	203.87	219.36	236.03	253.97
OPER & MAIN SUPPLIES	10.34	10.97	11.64	12.35	13.11	13.91	14.76	15.66	16.61	17.62
TOTAL DIRECT COST	420.47	449.08	480.40	513.93	549.84	588.30	629.49	673.60	720.86	771.47
OVERHEAD	63.65	67.00	70.59	74.45	78.59	83.04	89.82	74.95	80.46	86.38
TOTAL	484.12	516.08	550.99	588.37	628.42	671.33	699.31	748.55	801.32	857.85
PRICE ($/M3)	587.15	626.49	668.46	713.25	761.03	812.02	866.43	924.48	986.42	1052.51

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
WORKING CAPITAL:										
WOOD INV	10.45	11.19	11.98	12.83	13.74	14.72	15.76	16.88	18.08	19.37
RAW MATERIALS INV	2.93	3.12	3.32	3.53	3.76	4.01	4.27	4.54	4.84	5.15
FINISHED GOODS INV	20.08	21.39	22.81	24.34	25.97	27.72	29.60	31.62	33.77	36.09
SPARE PARTS INV	15.41	16.35	17.34	18.40	19.52	20.71	21.98	23.32	24.74	26.25
RECEIVABLES	26.13	27.93	29.85	31.90	34.09	36.43	38.92	41.59	44.43	47.46
LESS:										
PAYABLES	6.69	7.13	7.60	8.11	8.66	9.24	9.87	10.54	11.26	12.03
TOTAL	68.30	72.84	77.71	82.89	88.44	94.35	100.66	107.41	114.61	122.29
ADDITIONS	4.25	4.54	4.86	5.19	5.54	5.91	6.31	6.74	7.20	7.69
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	4.25	4.54	4.86	5.19	5.54	5.91	6.31	6.74	7.20	7.69
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	4.25	4.54	4.86	5.19	5.54	5.91	6.31	6.74	7.20	7.69
TOTAL CASH REQUIREMENT	15.62	16.61	17.67	18.78	19.96	21.21	22.55	23.96	25.47	27.07
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	11.20	11.22	11.22	11.22	11.21	11.21	11.20	11.19	11.18	11.17

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: NEWSPRINT + LUMBER BASE CASE

CASH FLOW ($MILLIONS)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GROSS SALES REVENUE	348.26	371.60	396.49	423.06	451.40	481.65	513.92	548.35	585.09	624.29
LESS:										
SELLING COST	3.48	3.72	3.96	4.23	4.51	4.82	5.14	5.48	5.85	6.24
DISTRIBUTION COST	26.85	28.06	29.34	30.69	32.11	33.62	35.22	36.91	38.69	40.57
NET SALES REVENUE	317.93	339.82	363.19	388.14	414.77	443.21	473.56	505.96	540.55	577.47
LESS:										
MANUFACTURING COSTS	190.01	201.03	213.03	225.87	239.64	254.38	250.44	267.36	285.49	304.91
GENERAL & ADMIN COSTS	4.80	5.07	5.36	5.67	5.99	6.33	6.70	7.08	7.48	7.91
INSURANCE (#HARF)	.56	.59	.62	.66	.69	.73	.77	.82	.87	.91
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	30.08	30.53	31.19	31.89	32.63	33.42	14.52	15.41	16.35	17.35
PRE-TAX INCOME	152.65	163.66	175.37	187.83	201.08	215.18	230.17	246.11	263.06	281.09
LESS:										
INVENTORY ALLOWANCE	1.47	1.56	1.66	1.77	1.89	2.01	2.15	2.29	2.44	2.61
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	18.32	18.20	18.25	18.45	18.78	19.24	19.81	20.49	21.28	22.18
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	132.86	143.89	155.45	167.61	180.41	193.92	208.21	223.33	239.34	256.31
GROSS TAX	63.11	68.35	73.84	79.61	85.69	92.11	98.90	106.08	113.69	121.75
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	63.11	68.35	73.84	79.61	85.69	92.11	98.90	106.08	113.69	121.75
OPERATING CASH FLOW	89.54	95.31	101.53	108.22	115.39	123.06	131.27	140.03	149.38	159.34
LESS:										
CASH REQUIRED	15.62	16.61	17.67	18.78	19.96	21.21	22.55	23.96	25.47	27.07
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	122.29
NET CASH FLOW	73.91	78.70	83.86	89.44	95.43	101.85	108.72	116.07	123.91	254.56

RATE OF RETURN IS 10.3 %
NET PRESENT VALUE AT 10% IS 10.1 $MILLION
NET PRESENT VALUE AT 15% IS -94.9 $MILLION
PAYBACK PERIOD IS 9.8 YEARS AFTER START-UP

APPENDIX H

CTMP BASE CASE COMPUTER PRINTOUT

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	0	0	0	0	0	0	265263	360000	360000	360000
COST ($/M3):										
LABOR	.00	.00	.00	.00	.00	.00	22.62	24.55	26.54	28.63
FUEL, OIL & LUBE	.00	.00	.00	.00	.00	.00	4.97	5.31	5.65	6.04
SUPPLIES & PARTS	.00	.00	.00	.00	.00	.00	15.03	15.96	16.94	17.94
STUMPAGE	.00	.00	.00	.00	.00	.00	2.26	2.40	2.54	2.69
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	44.89	48.22	51.67	55.29
OVERHEAD	.00	.00	.00	.00	.00	.00	59.81	39.71	38.71	40.28
TOTAL	.00	.00	.00	.00	.00	.00	104.70	87.94	90.39	95.57
PULP/PAPER										
PRODUCTION (MT)	0	0	0	0	0	0	110084	149400	149400	149400
COST ($/MT):										
WOOD	.00	.00	.00	.00	.00	.00	252.29	211.90	217.80	230.30
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	72.80	72.80	72.80	72.80
FUEL	.00	.00	.00	.00	.00	.00	5.39	5.76	6.14	6.55
LABOR	.00	.00	.00	.00	.00	.00	55.17	44.11	47.68	51.45
CHEMICALS	.00	.00	.00	.00	.00	.00	92.94	92.79	104.42	108.91
FINISHING SUPPLIES	.00	.00	.00	.00	.00	.00	11.61	12.33	13.08	13.85
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	13.06	13.87	14.71	15.58
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	503.25	459.56	476.64	499.44
OVERHEAD	.00	.00	.00	.00	.00	.00	149.81	113.24	116.07	119.06
TOTAL	.00	.00	.00	.00	.00	.00	653.07	572.80	592.71	618.51
PRICE ($/MT)	.00	.00	.00	.00	.00	.00	800.49	850.85	904.52	961.77
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	.00	.00	.00	.00	.00	30.47	3.77	3.69	5.71	7.95
PULP/PAPER MILL	.00	.00	.00	29.07	137.44	55.71	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	18.28	21.38	4.87	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	47.35	158.82	91.05	3.77	3.69	5.71	7.95
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	47.35	158.82	91.05	3.77	3.69	5.71	7.95
WORKING CAPITAL:										
WOOD INV	.00	.00	.00	.00	.00	.00	3.05	4.21	4.52	4.84
RAW MATERIALS INV	.00	.00	.00	.00	.00	.00	1.83	2.64	2.80	2.94
FINISHED GOODS INV	.00	.00	.00	.00	.00	.00	7.26	8.93	9.28	9.74
SPARE PARTS INV	.00	.00	.00	.00	.00	.00	3.66	3.89	4.13	4.37
RECEIVABLES	.00	.00	.00	.00	.00	.00	6.19	8.97	9.57	10.21
LESS:										
PAYABLES	.00	.00	.00	.00	.00	.00	2.42	2.98	3.09	3.25
TOTAL	.00	.00	.00	.00	.00	.00	19.58	25.66	27.20	28.85
ADDITIONS	.00	.00	.00	.00	.00	.00	19.58	6.09	1.54	1.65
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	19.58	6.09	1.54	1.65
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	19.58	6.09	1.54	1.65
TOTAL CASH REQUIREMENT	.00	.00	.00	47.35	158.82	91.05	23.34	9.78	7.25	9.60
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	.00	.00	.00	.00	.00	.00	9.09	9.82	9.79	9.88

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CASH FLOW ($MILLIONS)										
GROSS SALES REVENUE	.00	.00	.00	.00	.00	.00	88.12	127.12	135.14	143.69
LESS:										
SELLING COST	.00	.00	.00	.00	.00	.00	.88	1.27	1.35	1.44
DISTRIBUTION COST	.00	.00	.00	.00	.00	.00	11.91	16.76	17.38	18.05
NET SALES REVENUE	.00	.00	.00	.00	.00	.00	75.33	109.09	116.40	124.20
LESS:										
MANUFACTURING COSTS	.00	.00	.00	.00	.00	.00	71.69	85.58	88.55	92.40
GENERAL & ADMIN COSTS	.00	.00	.00	.00	.00	.00	1.81	1.92	2.03	2.15
INSURANCE (SHARE)	.00	.00	.00	.00	.00	.00	.25	.27	.28	.30
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	.00	.00	.00	.00	.00	.00	21.38	19.41	18.43	18.76
PRE-TAX INCOME	.00	.00	.00	.00	.00	.00	22.76	40.73	44.17	48.11
LESS:										
INVENTORY ALLOWANCE	.00	.00	.00	.00	.00	.00	.47	.59	.62	.66
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	.00	.00	.00	.00	.00	.00	22.28	40.14	43.54	47.45
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GROSS TAX	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPERATING CASH FLOW	.00	.00	.00	.00	.00	.00	22.76	40.73	44.17	48.11
LESS:										
CASH REQUIRED	.00	.00	.00	47.35	158.82	91.05	23.34	5.78	7.25	9.60
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	.00	.00	.00	(47.35)	(158.82)	(91.05)	(.59)	30.95	36.92	38.51

RATE OF RETURN IS 10.5 %
NET PRESENT VALUE AT 10% IS 11.1 $MILLION
NET PRESENT VALUE AT 15% IS -59.4 $MILLION
PAYBACK PERIOD IS 9.9 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	30.39	32.40	36.00	38.81	41.88	45.14	48.66	52.36	56.34	60.62
FUEL, OIL & LUBE	6.44	6.86	7.31	7.80	8.31	8.86	9.44	10.07	10.73	11.44
SUPPLIES & PARTS	19.19	20.59	21.85	23.23	24.85	26.52	28.19	29.91	31.73	33.67
STUMPAGE	2.84	3.01	3.19	3.37	3.56	3.78	4.00	4.23	4.47	4.72
TOTAL DIRECT COST	59.37	63.86	68.35	73.20	78.60	84.30	90.29	96.56	103.27	110.45
OVERHEAD	44.02	48.69	50.41	49.16	53.23	54.51	56.31	58.70	61.62	64.84
TOTAL	103.38	112.56	118.77	122.36	131.83	138.81	146.60	155.26	164.89	175.29
PULP/PAPER										
PRODUCTION (MT)	149400	149400	149400	149400	149400	149400	149400	149400	149400	149400
COST ($/MT):										
WOOD	249.12	271.22	288.18	294.84	317.66	334.48	353.26	374.13	397.33	422.39
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80
FUEL	6.93	7.44	7.93	8.46	9.02	9.61	10.25	10.92	11.64	12.41
LABOR	88.51	93.01	94.69	99.74	75.24	81.11	87.44	94.09	101.24	108.93
CHEMICALS	118.17	125.14	128.15	135.32	143.17	153.77	163.46	174.90	187.14	200.24
FINISHING SUPPLIES	14.32	15.90	16.37	17.93	19.19	20.48	21.77	23.09	24.50	26.00
OPER & MAIN SUPPLIES	16.67	17.39	18.98	20.18	21.59	23.04	24.49	25.98	27.56	29.25
TOTAL DIRECT COST	534.88	570.41	595.61	619.27	658.07	695.29	733.45	775.91	822.21	872.02
OVERHEAD	122.33	125.35	129.52	133.42	137.69	142.29	147.16	152.26	157.73	163.60
TOTAL	656.37	696.26	725.12	752.69	796.36	837.57	880.61	928.17	979.95	1035.61
PRICE ($/MT)	1082.87	1088.13	1157.35	1231.35	1310.28	1394.42	1484.45	1580.18	1682.10	1790.79
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.89	8.45	8.98	9.53	10.11	10.72
WORKING CAPITAL:										
WOOD INV	5.20	5.60	6.00	6.43	6.91	7.42	7.96	8.52	9.12	9.76
RAW MATERIALS INV	3.17	3.37	3.49	3.70	3.92	4.20	4.47	4.77	5.10	5.44
FINISHED GOODS INV	10.42	11.14	11.65	12.14	12.92	13.66	14.43	15.28	16.21	17.21
SPARE PARTS INV	4.68	5.02	5.32	5.66	6.06	6.46	6.87	7.29	7.73	8.20
RECEIVABLES	10.69	11.62	12.40	13.23	14.12	15.07	16.08	17.15	18.30	19.53
LESS:										
PAYABLES	3.47	3.71	3.86	4.05	4.31	4.55	4.81	5.09	5.40	5.74
TOTAL	30.89	33.03	34.98	37.11	39.63	42.26	44.99	47.92	51.06	54.41
ADDITIONS	2.04	2.15	1.95	2.13	2.51	2.63	2.73	2.93	3.14	3.35
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	2.04	2.15	1.95	2.13	2.51	2.63	2.73	2.93	3.14	3.35
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	2.04	2.15	1.95	2.13	2.51	2.63	2.73	2.93	3.14	3.35
TOTAL CASH REQUIREMENT	10.52	11.22	11.57	12.33	13.40	11.08	11.71	12.45	13.25	14.08
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	9.89	9.90	10.01	10.17	10.20	10.28	10.35	10.41	10.45	10.49

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	65.23	70.19	75.52	81.26	87.44	94.08	101.23	108.93	117.20	126.11
FUEL, OIL & LUBE	12.20	13.00	13.86	14.77	15.75	16.79	17.90	19.08	20.34	21.68
SUPPLIES & PARTS	35.72	37.90	40.21	42.66	45.27	48.03	50.96	54.06	57.36	60.86
STUMPAGE	4.94	5.28	5.58	5.90	6.23	6.59	6.96	7.36	7.78	8.22
TOTAL DIRECT COST	118.14	126.36	135.17	144.59	154.68	165.48	177.05	189.43	202.68	216.87
OVERHEAD	68.27	72.18	76.86	81.85	87.16	92.83	98.87	105.31	112.17	119.49
TOTAL	186.41	198.54	212.03	226.44	241.85	258.31	275.92	294.73	314.85	336.36
PULP/PAPER										
PRODUCTION (MT)	149400	149400	149400	149400	149400	149400	149400	149400	149400	149400
COST ($/MT):										
WOOD	449.18	478.41	510.91	545.64	582.78	622.44	664.88	710.20	758.68	810.50
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80	72.80
FUEL	13.23	14.10	15.04	16.03	17.09	18.21	19.41	20.70	22.06	23.52
LABOR	117.21	126.12	135.73	146.11	157.11	169.05	181.90	195.72	210.63	226.81
CHEMICALS	214.26	229.26	245.30	262.47	280.85	300.51	321.54	344.05	368.13	393.90
FINISHING SUPPLIES	27.59	29.27	31.05	32.94	34.95	37.09	39.35	41.75	44.30	47.00
OPER & MAIN SUPPLIES	31.03	32.92	34.93	37.06	39.32	41.72	44.27	46.97	49.83	52.87
TOTAL DIRECT COST	925.29	982.88	1045.73	1112.96	1184.88	1261.82	1344.13	1432.19	1526.40	1627.20
OVERHEAD	169.89	176.60	183.82	191.54	199.82	208.70	143.84	154.04	164.97	176.68
TOTAL	1095.18	1159.48	1229.55	1304.51	1384.71	1470.52	1487.97	1586.23	1691.37	1803.88
PRICE ($/MT)	1906.67	2030.23	2161.99	2302.48	2452.25	2612.04	2782.38	2964.03	3157.72	3364.27
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	0	0	0	0
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
FUEL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LABOR	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OVERHEAD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TOTAL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

CASH FLOW ($MILLIONS)	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
GROSS SALES REVENUE	152.82	162.57	172.94	183.96	195.76	208.33	221.78	236.08	251.31	267.54
LESS:										
SELLING COST	1.53	1.63	1.73	1.84	1.96	2.08	2.22	2.36	2.51	2.68
DISTRIBUTION COST	18.76	19.53	20.31	21.11	21.99	22.92	23.96	25.00	26.09	27.23
NET SALES REVENUE	132.53	141.41	150.89	161.01	171.80	183.32	195.61	208.72	222.71	237.64
LESS:										
MANUFACTURING COSTS	98.06	104.02	108.33	112.45	118.98	125.13	131.56	138.67	146.40	154.72
GENERAL & ADMIN COSTS	2.28	2.42	2.56	2.70	2.86	3.03	3.21	3.39	3.58	3.79
INSURANCE (WHARF)	.32	.34	.35	.37	.40	.42	.44	.47	.50	.53
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	19.63	20.79	20.87	19.85	20.69	20.48	20.42	20.55	20.81	21.13
PRE-TAX INCOME	51.50	55.43	60.52	65.34	70.26	75.21	80.81	86.74	93.03	99.73
LESS:										
INVENTORY ALLOWANCE	.70	.75	.79	.84	.89	.95	1.01	1.08	1.14	1.22
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	28.46	23.78	21.46	19.70	18.40	17.22	16.56	16.13	15.89	15.83
PLUS:										
TAX CREDIT ADJUSTMENT	3.53	4.88	(.00)	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	25.87	35.78	38.27	44.60	50.97	57.04	63.24	69.53	76.00	82.69
GROSS TAX	12.29	16.99	18.16	21.28	24.21	27.10	30.04	33.03	36.10	39.28
LESS:										
INVESTMENT TAX CREDIT	3.53	4.88	(.00)	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	8.75	12.11	18.18	21.28	24.21	27.10	30.04	33.03	36.10	39.28
OPERATING CASH FLOW	42.75	43.31	42.34	44.06	46.05	48.12	50.77	53.71	56.94	60.46
LESS:										
CASH REQUIRED	10.62	11.22	11.57	12.33	13.40	11.08	11.71	12.45	13.25	14.08
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	32.12	32.10	30.76	31.72	32.66	37.04	39.06	41.25	43.69	46.38

RATE OF RETURN IS 10.5 %
NET PRESENT VALUE AT 10% IS 11.1 $MILLION
NET PRESENT VALUE AT 15% IS -59.4 $MILLION
PAYBACK PERIOD IS 9.9 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
WORKING CAPITAL:										
WOOD INV	10.45	11.19	11.98	12.83	13.74	14.72	15.76	16.88	18.08	19.37
RAW MATERIALS INV	5.31	6.20	6.63	7.07	7.55	8.07	8.61	9.20	9.82	10.49
FINISHED GOODS INV	18.24	19.43	20.69	22.04	23.48	25.02	26.67	28.44	30.33	32.36
SPARE PARTS INV	8.70	9.23	9.80	10.40	11.03	11.70	12.42	13.17	13.98	14.83
RECEIVABLES	20.84	22.24	23.73	25.32	27.02	28.83	30.76	32.82	35.02	37.37
LESS:										
PAYABLES	6.09	6.48	6.90	7.35	7.83	8.34	8.89	9.48	10.11	10.79
TOTAL	57.44	61.82	65.93	70.31	75.00	80.00	85.33	91.04	97.13	103.63
ADDITIONS	3.58	3.83	4.11	4.38	4.68	5.00	5.34	5.70	6.09	6.50
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	3.58	3.83	4.11	4.38	4.68	5.00	5.34	5.70	6.09	6.50
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	3.58	3.83	4.11	4.38	4.68	5.00	5.34	5.70	6.09	6.50
TOTAL CASH REQUIREMENT	14.96	15.90	16.91	17.97	19.10	20.30	21.57	22.92	24.36	25.89
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	10.32	10.54	10.56	10.57	10.58	10.59	10.60	10.60	10.61	10.61

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP BASE CASE

CASH FLOW ($MILLIONS)	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GROSS SALES REVENUE	284.06	303.32	323.00	343.99	366.37	390.24	415.69	442.83	471.76	502.62
LESS:										
SELLING COST	2.85	3.03	3.23	3.44	3.66	3.90	4.16	4.43	4.72	5.03
DISTRIBUTION COST	28.44	29.72	31.68	32.51	34.02	35.62	37.31	39.10	40.99	42.98
NET SALES REVENUE	253.56	270.56	288.09	308.04	328.69	350.71	374.22	399.30	426.06	454.61
LESS:										
MANUFACTURING COSTS	183.62	173.23	183.64	194.89	206.85	219.70	222.30	236.98	252.69	269.50
GENERAL & ADMIN COSTS	4.00	4.23	4.47	4.72	4.99	5.28	5.58	5.90	6.23	6.59
INSURANCE (SHARE)	.56	.59	.62	.66	.69	.73	.77	.82	.87	.91
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	21.46	21.91	22.57	23.27	24.01	24.80	14.52	15.41	16.35	17.35
PRE-TAX INCOME	166.85	114.43	122.48	131.04	140.13	149.81	160.09	171.01	182.62	194.96
LESS:										
INVENTORY ALLOWANCE	1.30	1.38	1.47	1.57	1.67	1.79	1.90	2.03	2.17	2.31
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	15.40	16.11	16.44	16.87	17.40	18.03	18.75	19.56	20.46	21.44
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	89.85	96.93	104.57	112.60	121.06	129.99	139.44	149.42	160.00	171.20
GROSS TAX	42.58	46.04	49.67	53.48	57.50	61.75	66.23	70.98	76.00	81.32
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	42.58	46.04	49.67	53.48	57.50	61.75	66.23	70.98	76.00	81.32
OPERATING CASH FLOW	64.27	68.38	72.81	77.55	82.53	88.06	93.85	100.03	106.62	113.64
LESS:										
CASH REQUIRED	14.96	15.90	16.91	17.97	19.10	20.30	21.57	22.92	24.36	25.89
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	103.63
NET CASH FLOW	49.31	52.48	55.89	59.58	63.53	67.76	72.28	77.11	82.26	191.37

RATE OF RETURN IS 13.5 %
NET PRESENT VALUE AT 10% IS 11.1 $MILLION
NET PRESENT VALUE AT 15% IS -54.4 $MILLION
PAYBACK PERIOD IS 9.9 YEARS AFTER START-UP

APPENDIX I

CTMP AND LUMBER BASE CASE

COMPUTER PRINTOUT

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	0	0	0	0	0	0	257305	360000	360000	360000
COST ($/M3):										
LABOR	.00	.00	.00	.00	.00	.00	22.62	24.55	26.54	28.63
FUEL, OIL & LUBE	.00	.00	.00	.00	.00	.00	4.97	5.31	5.66	6.04
SUPPLIES & PARTS	.00	.00	.00	.00	.00	.00	15.03	15.96	16.94	17.94
STUMPAGE	.00	.00	.00	.00	.00	.00	2.26	2.40	2.54	2.69
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	44.89	48.22	51.67	55.29
OVERHEAD	.00	.00	.00	.00	.00	.00	61.66	39.71	38.71	40.28
TOTAL	.00	.00	.00	.00	.00	.00	106.55	87.94	90.39	95.57
PULP/PAPER										
PRODUCTION (MT)	0	0	0	0	0	0	86306	121612	121612	121612
COST ($/MT):										
WOOD	.00	.00	.00	.00	.00	.00	256.74	211.90	217.80	230.30
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	.00	.00	.00	.00	.00	.00	86.80	86.80	86.80	86.80
FUEL	.00	.00	.00	.00	.00	.00	5.39	5.76	6.14	6.55
LABOR	.00	.00	.00	.00	.00	.00	70.37	54.19	58.58	63.20
CHEMICALS	.00	.00	.00	.00	.00	.00	92.94	98.79	104.42	108.91
FINISHING SUPPLIES	.00	.00	.00	.00	.00	.00	11.61	12.33	13.08	13.85
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	13.00	13.67	14.71	15.58
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	536.91	483.64	501.54	525.20
OVERHEAD	.00	.00	.00	.00	.00	.00	190.91	138.97	142.44	146.11
TOTAL	.00	.00	.00	.00	.00	.00	727.82	622.60	643.98	671.30
PRICE ($/MT)	.00	.00	.00	.00	.00	.00	800.49	850.85	904.52	961.77
LUMBER										
PRODUCTION (M3)	0	0	0	0	0	0	38198	51840	51840	51840
COST ($/M3):										
WOOD	.00	.00	.00	.00	.00	.00	137.63	113.59	116.75	123.45
ELECTRICITY	.00	.00	.00	.00	.00	.00	3.10	3.10	3.10	3.10
FUEL	.00	.00	.00	.00	.00	.00	14.38	15.37	16.39	17.47
LABOR	.00	.00	.00	.00	.00	.00	61.83	49.43	53.44	57.06
OPER & MAIN SUPPLIES	.00	.00	.00	.00	.00	.00	4.35	4.62	4.90	5.19
TOTAL DIRECT COST	.00	.00	.00	.00	.00	.00	221.29	186.11	194.58	206.87
OVERHEAD	.00	.00	.00	.00	.00	.00	46.78	35.84	37.21	38.65
TOTAL	.00	.00	.00	.00	.00	.00	268.07	221.96	231.79	245.52
PRICE ($/M3)	.00	.00	.00	.00	.00	.00	236.63	252.70	269.63	287.70

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	.00	.00	.00	.00	.00	30.47	3.77	3.69	5.71	7.95
PULP/PAPER MILL	.00	.00	.00	29.07	137.44	55.71	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	18.65	.00	.00	.00	.00
WHARF	.00	.00	.00	18.28	21.38	4.87	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	47.35	158.82	109.70	3.77	3.69	5.71	7.95
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	47.35	158.82	109.70	3.77	3.69	5.71	7.95
WORKING CAPITAL:										
WOOD INV	.00	.00	.00	.00	.00	.00	2.98	4.21	4.52	4.84
RAW MATERIALS INV	.00	.00	.00	.00	.00	.00	1.55	2.32	2.46	2.59
FINISHED GOODS INV	.00	.00	.00	.00	.00	.00	7.27	9.00	9.37	9.85
SPARE PARTS INV	.00	.00	.00	.00	.00	.00	3.95	4.20	4.45	4.72
RECEIVABLES	.00	.00	.00	.00	.00	.00	5.46	8.17	8.73	9.32
LESS:										
PAYABLES	.00	.00	.00	.00	.00	.00	2.42	3.00	3.12	3.28
TOTAL	.00	.00	.00	.00	.00	.00	18.79	24.90	26.40	28.02
ADDITIONS	.00	.00	.00	.00	.00	.00	18.79	6.12	1.50	1.62
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	18.79	6.12	1.50	1.62
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	.00	.00	.00	.00	.00	.00	18.79	6.12	1.50	1.62
TOTAL CASH REQUIREMENT	.00	.00	.00	47.35	158.82	109.70	22.55	9.81	7.21	9.57
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	.00	.00	.00	.00	.00	.00	6.75	9.30	9.46	9.54

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTWP + LJ4BEP BASE CASE

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
CASH FLOW ($MILLIONS)										
GROSS SALES REVENUE	.00	.00	.00	.00	.00	.00	78.13	116.57	123.98	131.88
LESS:										
SELLING COST	.00	.00	.00	.00	.00	.00	.78	1.17	1.24	1.32
DISTRIBUTION COST	.00	.00	.00	.00	.00	.00	10.99	15.97	16.56	17.20
NET SALES REVENUE	.00	.00	.00	.00	.00	.00	66.36	99.44	106.17	113.36
LESS:										
MANUFACTURING COSTS	.00	.00	.00	.00	.00	.00	73.06	87.22	90.33	94.37
GENERAL & ADMIN COSTS	.00	.00	.00	.00	.00	.00	1.81	1.92	2.03	2.15
INSURANCE (WHARF)	.00	.00	.00	.00	.00	.00	.25	.27	.28	.30
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	.00	.00	.00	.00	.00	.00	22.32	20.34	19.57	19.69
PRE-TAX INCOME	.00	.00	.00	.00	.00	.00	13.56	30.37	33.09	36.24
LESS:										
INVENTORY ALLOWANCE	.00	.00	.00	.00	.00	.00	.47	.59	.62	.66
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	.00	.00	.00	.00	.00	.00	13.08	29.78	32.47	35.58
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
GROSS TAX	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
OPERATING CASH FLOW	.00	.00	.00	.00	.00	.00	13.56	30.37	33.09	36.24
LESS:										
CASH REQUIRED	.00	.00	.00	47.35	158.82	109.70	22.55	9.81	7.21	9.57
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	.00	.00	.00	(47.35)	(158.82)	(109.70)	(9.00)	20.56	25.88	26.67

RATE OF RETURN IS 7.6 %
NET PRESENT VALUE AT 10% IS -53.3 $MILLION
NET PRESENT VALUE AT 15% IS -97.2 $MILLION
PAYBACK PERIOD IS 12.7 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	30.89	33.40	36.00	38.81	41.66	45.14	48.56	52.36	56.34	60.62
FUEL, OIL & LUBE	6.44	6.86	7.31	7.80	8.31	8.86	9.44	10.07	10.73	11.44
SUPPLIES & PARTS	19.19	20.59	21.85	23.23	24.65	26.32	28.19	29.91	31.73	33.67
STUMPAGE	2.84	3.31	3.19	3.37	3.56	3.78	4.00	4.23	4.47	4.72
TOTAL DIRECT COST	59.37	63.86	68.35	73.20	78.60	84.30	90.29	96.56	103.27	110.45
OVERHEAD	44.02	48.69	50.41	49.16	53.23	54.51	56.31	58.70	61.62	64.84
TOTAL	103.38	112.56	118.77	122.36	131.83	138.81	146.60	155.26	164.89	175.29
PULP/PAPER										
PRODUCTION (MT)	121612	121612	121612	121612	121612	121612	121612	121612	121612	121612
COST ($/MT):										
WOOD	249.12	271.22	286.18	294.34	317.66	334.48	353.26	374.13	397.33	422.39
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80
FUEL	6.93	7.44	7.93	8.46	9.02	9.61	10.25	10.92	11.64	12.41
LABOR	68.20	73.72	79.47	85.67	92.44	99.65	107.42	115.58	124.37	133.82
CHEMICALS	118.17	125.14	128.16	135.32	143.17	153.77	163.46	174.90	187.14	200.24
FINISHING SUPPLIES	14.32	15.90	16.87	17.92	19.19	20.49	21.77	23.09	24.50	26.00
OPER & MAIN SUPPLIES	16.87	17.89	18.98	20.18	21.59	23.04	24.49	25.98	27.56	29.25
TOTAL DIRECT COST	560.76	598.12	624.39	649.20	669.87	727.82	767.43	811.41	859.35	910.91
OVERHEAD	150.07	154.42	158.91	163.70	168.93	174.37	180.54	186.79	193.50	200.68
TOTAL	710.83	752.54	783.30	812.90	858.80	902.19	947.97	998.20	1052.84	1111.59
PRICE ($/MT)	1022.87	1086.13	1157.55	1231.35	1310.28	1394.42	1484.49	1580.18	1682.10	1790.79
LUMBER										
PRODUCTION (M3)	51840	51840	51840	51840	51840	51840	51840	51840	51840	51840
COST ($/M3):										
WOOD	132.54	145.34	153.41	158.05	170.25	179.30	189.36	200.55	212.98	226.42
ELECTRICITY	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
FUEL	16.62	19.85	21.16	22.56	24.04	25.63	27.32	29.13	31.05	33.10
LABOR	62.22	67.26	72.50	78.16	84.33	90.91	98.00	105.45	113.46	122.08
OPER & MAIN SUPPLIES	5.56	5.96	6.33	6.73	7.20	7.68	8.16	8.66	9.19	9.75
TOTAL DIRECT COST	222.03	241.50	256.49	268.38	286.96	306.61	325.95	346.88	369.78	394.45
OVERHEAD	40.22	41.94	43.72	45.63	47.72	49.96	52.35	54.86	57.56	60.45
TOTAL	262.25	283.49	300.42	314.22	336.67	356.58	378.30	401.75	427.34	454.90
PRICE ($/M3)	306.97	327.54	345.49	372.90	397.69	424.55	452.94	483.34	515.72	550.28

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CASH REQUIREMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	8.48	9.07	9.62	10.20	10.29	8.45	8.98	9.53	10.11	10.72
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.29	8.45	8.98	9.53	10.11	10.72
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	8.48	9.07	9.62	10.20	10.29	8.45	8.98	9.53	10.11	10.72
WORKING CAPITAL:										
WOOD INV	5.20	5.60	6.00	6.43	6.71	7.42	7.96	8.52	9.12	9.76
RAW MATERIALS INV	2.79	2.98	3.08	3.26	3.46	3.71	3.94	4.21	4.49	4.80
FINISHED GOODS INV	10.53	11.27	11.82	12.33	13.14	13.90	14.69	15.57	16.53	17.56
SPARE PARTS INV	5.05	5.41	5.74	6.11	6.53	6.97	7.41	7.86	8.34	8.85
RECEIVABLES	9.95	10.62	11.34	12.10	12.92	13.79	14.72	15.72	16.78	17.91
LESS:										
PAYABLES	3.51	3.76	3.94	4.11	4.38	4.63	4.90	5.19	5.51	5.85
TOTAL	30.00	32.11	34.04	36.12	38.39	41.16	43.83	46.69	49.75	53.03
ADDITIONS	1.93	2.10	1.93	2.09	2.47	2.67	2.67	2.86	3.06	3.27
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	1.93	2.10	1.93	2.09	2.47	2.67	2.67	2.86	3.06	3.27
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	1.93	2.10	1.93	2.09	2.47	2.67	2.67	2.86	3.06	3.27
TOTAL CASH REQUIREMENT	10.47	11.18	11.55	12.29	13.35	11.31	11.65	12.38	13.17	14.00
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	9.54	9.55	9.54	9.79	9.81	9.88	9.95	9.99	10.03	10.06

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
CASH FLOW ($MILLIONS)										
GROSS SALES REVENUE	140.31	149.31	158.89	169.08	179.97	191.66	204.01	217.22	231.30	246.31
LESS:										
SELLING COST	1.40	1.44	1.59	1.69	1.80	1.92	2.04	2.17	2.31	2.46
DISTRIBUTION COST	17.57	18.60	19.35	20.12	20.95	21.84	22.83	23.82	24.85	25.95
NET SALES REVENUE	121.03	129.21	137.94	147.27	157.22	167.83	179.15	191.23	204.13	217.90
LESS:										
MANUFACTURING COSTS	100.09	106.21	110.82	115.15	121.86	128.23	134.86	142.22	150.19	158.76
GENERAL & ADMIN COSTS	2.48	2.42	2.56	2.70	2.86	3.03	3.21	3.39	3.58	3.79
INSURANCE (WHARF)	.32	.34	.35	.37	.40	.42	.44	.47	.50	.53
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	20.56	21.72	21.60	20.78	21.82	21.41	21.35	21.48	21.74	22.06
PRE-TAX INCOME	38.90	41.46	46.01	49.83	52.09	57.56	61.95	66.63	71.60	76.88
LESS:										
INVENTORY ALLOWANCE	.71	.76	.80	.84	.90	.96	1.02	1.08	1.15	1.23
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	38.20	40.57	27.57	24.53	22.26	20.32	19.08	18.20	17.61	17.26
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.12	(.00)	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	.00	.76	17.65	24.46	30.65	36.28	41.85	47.35	52.84	58.40
GROSS TAX	.00	.36	5.38	11.02	14.50	17.23	19.88	22.49	25.10	27.74
LESS:										
INVESTMENT TAX CREDIT	.00	.12	(.00)	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	.00	.24	5.38	11.02	14.50	17.23	19.88	22.49	25.10	27.74
OPERATING CASH FLOW	38.90	41.72	37.63	38.21	39.19	40.33	42.08	44.14	46.51	49.14
LESS:										
CASH REQUIRED	10.47	11.18	11.55	12.29	13.35	11.01	11.65	12.38	13.17	14.00
PLUS:										
RESIDUAL VALUE	.01	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH FLOW	28.44	30.54	26.09	25.92	25.84	29.32	30.42	31.76	33.34	35.15

RATE OF RETURN IS 7.6 %
NET PRESENT VALUE AT 10% IS -53.3 $MILLION
NET PRESENT VALUE AT 15% IS -97.2 $MILLION
PAYBACK PERIOD IS 12.7 YEARS AFTER START-UP

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: GTMP + LUMBER BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
UNIT COSTS & PRICES										
WOOD										
HARVESTED (M3)	360000	360000	360000	360000	360000	360000	360000	360000	360000	360000
COST ($/M3):										
LABOR	65.23	70.19	75.52	81.26	87.44	94.08	101.23	108.93	117.20	126.11
FUEL, OIL & LUBE	12.20	13.00	13.86	14.77	15.75	16.79	17.90	19.08	20.34	21.68
SUPPLIES & PARTS	35.72	37.90	40.21	42.66	45.27	48.03	50.96	54.06	57.36	60.86
STUMPAGE	4.99	5.28	5.58	5.90	6.23	6.59	6.96	7.36	7.78	8.22
TOTAL DIRECT COST	118.14	126.36	135.17	144.59	154.68	165.48	177.05	189.43	202.68	216.87
OVERHEAD	68.27	72.18	76.36	81.85	87.16	92.83	98.87	105.31	112.17	119.49
TOTAL	186.41	198.54	211.53	226.44	241.85	258.31	275.92	294.73	314.85	336.36
PULP/PAPER										
PRODUCTION (MT)	121612	121612	121612	121612	121612	121612	121612	121612	121612	121612
COST ($/MT):										
WOOD	444.19	476.41	510.71	545.64	582.76	622.44	664.80	710.20	758.68	810.50
SEMI-BLEACHED KRAFT PULP	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
ELECTRICITY	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80	86.80
FUEL	13.03	14.10	15.04	16.03	17.09	18.21	19.41	20.70	22.06	23.52
LABOR	143.99	154.93	166.71	179.38	193.01	207.69	223.46	240.45	258.72	278.39
CHEMICALS	214.26	229.26	245.30	262.47	280.85	300.51	321.54	344.05	368.13	393.90
FINISHING SUPPLIES	27.58	29.27	31.05	32.94	34.95	37.09	39.35	41.75	44.30	47.00
OPER & MAIN SUPPLIES	31.03	32.92	34.93	37.06	39.32	41.72	44.27	46.97	49.83	52.87
TOTAL DIRECT COST	960.87	1025.69	1090.74	1160.35	1234.75	1314.45	1399.69	1490.91	1588.52	1692.98
OVERHEAD	208.37	216.62	225.46	234.93	245.07	255.95	176.24	186.74	202.13	216.49
TOTAL	1174.44	1242.32	1316.20	1395.28	1479.82	1570.40	1575.94	1679.65	1790.65	1909.47
PRICE ($/MT)	1930.67	2030.23	2161.94	2302.48	2452.26	2611.04	2782.38	2964.03	3157.72	3364.27
LUMBER										
PRODUCTION (M3)	51840	51840	51840	51840	51840	51840	51840	51840	51840	51840
COST ($/M3):										
WOOD	240.78	256.45	273.07	290.49	309.38	329.65	351.37	374.70	399.68	426.46
ELECTRICITY	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10
FUEL	35.29	37.61	40.04	42.64	45.41	48.37	51.52	54.89	58.48	62.31
LABOR	131.98	141.35	152.04	163.65	176.36	189.47	203.87	219.36	236.03	253.97
OPER & MAIN SUPPLIES	10.34	10.97	11.64	12.35	13.11	13.91	14.76	15.66	16.61	17.62
TOTAL DIRECT COST	420.87	449.48	480.33	514.23	553.24	594.70	629.29	674.00	721.26	771.87
OVERHEAD	63.50	66.90	70.48	74.33	78.47	82.91	69.69	74.81	80.31	86.22
TOTAL	484.43	516.38	551.25	588.66	626.70	671.60	699.57	748.81	801.57	858.09
PRICE ($/M3)	517.13	526.49	668.48	713.25	761.03	812.02	866.43	924.48	986.42	1052.51

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CASH REQUIRMENTS ($MILLIONS)										
CAPITAL EXPENDITURES:										
WOODLANDS	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
PULP/PAPER MILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
SAWMILL	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
WHARF	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
LESS:										
LT DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
LT DEBT REPAYMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	11.38	12.07	12.81	13.59	14.42	15.30	16.23	17.22	18.27	19.39
WORKING CAPITAL:										
WOOD INV	10.45	11.19	11.98	12.83	13.74	14.72	15.76	16.88	18.08	19.37
RAW MATERIALS INV	5.12	5.47	5.84	6.23	6.65	7.10	7.59	8.10	8.65	9.23
FINISHED GOODS INV	18.60	19.85	21.14	22.53	24.02	25.61	27.31	29.13	31.09	33.18
SPARE PARTS INV	9.29	9.96	10.67	11.42	11.90	12.63	13.40	14.22	15.08	16.00
RECEIVABLES	19.12	20.40	21.78	23.25	24.81	26.48	28.27	30.17	32.20	34.36
LESS:										
PAYABLES	6.22	6.62	7.05	7.51	8.01	8.54	9.10	9.71	10.36	11.06
TOTAL	56.52	60.25	64.27	68.65	73.12	78.01	83.22	88.79	94.74	101.09
ADDITIONS	3.50	3.74	4.01	4.28	4.57	4.88	5.21	5.57	5.95	6.35
RE-FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CASH REQUIREMENT	3.50	3.74	4.01	4.28	4.57	4.88	5.21	5.57	5.95	6.35
LESS:										
ST DEBT FINANCING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET CASH REQUIREMENT	3.50	3.74	4.01	4.28	4.57	4.88	5.21	5.57	5.95	6.35
TOTAL CASH REQUIREMENT	14.87	15.81	16.82	17.87	18.99	20.18	21.45	22.79	24.22	25.74
DEBT/EQUITY RATIO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CURRENT RATIO	10.00	10.11	10.12	10.13	10.13	10.14	10.14	10.14	10.14	10.14

LABRADOR FOREST INDUSTRY CASH FLOW ANALYSIS
CASE: CTMP + LUMBER BASE CASE

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
CASH FLOW ($MILLIONS)										
GROSS SALES REVENUE	262.31	279.38	297.58	316.98	337.66	359.75	383.29	408.39	435.15	463.70
LESS:										
SELLING COST	2.62	2.79	2.98	3.17	3.38	3.60	3.83	4.08	4.35	4.64
DISTRIBUTION COST	27.10	28.32	29.61	30.97	32.42	33.94	35.55	37.25	39.05	40.95
NET SALES REVENUE	232.59	248.26	264.99	282.84	301.89	322.21	343.90	367.05	391.75	418.11
LESS:										
MANUFACTURING COSTS	167.94	177.85	188.64	200.20	212.56	225.79	227.92	243.08	259.32	276.70
GENERAL & ADMIN COSTS	4.00	4.23	4.47	4.72	4.99	5.28	5.58	5.90	6.23	6.59
INSURANCE (SHARE)	.56	.59	.62	.66	.69	.73	.77	.82	.87	.91
DEBT SERVICING	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
PLUS:										
DEPRECIATION	22.40	22.84	23.50	24.20	24.94	25.73	14.52	15.41	16.35	17.35
PRE-TAX INCOME	82.49	88.44	94.76	101.46	108.58	116.14	124.15	132.66	141.68	151.25
LESS:										
INVENTORY ALLOWANCE	1.31	1.39	1.49	1.58	1.69	1.80	1.92	2.05	2.19	2.33
LOSS CARRY FORWARD	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
CAPITAL COST ALLOWANCE	17.11	17.13	17.30	17.01	16.94	18.52	19.23	19.98	20.82	21.77
PLUS:										
TAX CREDIT ADJUSTMENT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TAXABLE INCOME	64.07	69.92	75.97	82.27	89.85	95.76	103.00	110.63	118.67	127.15
GROSS TAX	30.43	33.21	36.06	39.08	42.21	45.48	48.93	52.55	56.37	60.40
LESS:										
INVESTMENT TAX CREDIT	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
NET TAX PAYABLE	30.43	33.21	36.06	39.08	42.21	45.48	48.93	52.55	56.37	60.40
OPERATING CASH FLOW	52.06	55.23	58.67	62.34	66.26	70.65	75.23	80.11	85.31	90.85
LESS:										
CASH REQUIRED	14.87	15.81	16.82	17.87	18.99	20.13	21.45	22.79	24.22	25.74
PLUS:										
RESIDUAL VALUE	.00	.00	.00	.00	.00	.00	.00	.00	.00	101.09
NET CASH FLOW	37.18	39.42	41.86	44.52	47.39	50.47	53.78	57.32	61.09	166.20

RATE OF RETURN IS 7.6 %
NET PRESENT VALUE AT 10% IS -53.3 $MILLION
NET PRESENT VALUE AT 15% IS -67.4 $MILLION
PAYBACK PERIOD IS 12.7 YEARS AFTER START-UP